Bret and Heather 15th DarkHorse Podcast Livestream\_ Explorer...

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**SUMMARY KEYWORDS**

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**SPEAKERS**

Bret, Heather

**Bret** 00:08

Hey folks, welcome to the Dark Horse podcast live stream, our 15th live stream. I'm sitting with Dr. Heather hying. And we are we are prepared to have quite an interesting discussion today. I must say that some of the topics we are going to cover I regard as a bit dire. And I'm hoping that there will be some humor in here, but I should just prepare people at home that if there is humor, it is likely to be gallows humor. How are you feeling? Yeah, pretty much the same? Pretty much the same? Okay, good. I'm glad we're on the same page.

**Heather** 00:41

Yes, that's always a good thing.

**Bret** 00:42

Yes. for newcomers, let's alert them to the structure of things, we will do about an hour of conversation on some topics that we have decided to discuss. You can file Super Chat questions on YouTube, and we will do our best to answer them. We will start with two questions from Twitter. And then we will answer as many supercat questions as possible in the second hour. Anything else? announcement wise? All right, excellent. So I believe we're going to start today with a discussion of the question not of whether or not this virus has emerged from the lab. But a question that often comes up in response to discussions of that topic. And the question that I see variations of is, what difference would it make. So it's come from a lab, so it hasn't come from the lab, we still have to do the same things. And

**Heather** 01:42

which is true at a first approximation with regard to some of the actions that we might take.

**Bret** 01:47

Yes, some of them are certainly, absolutely universal. And it makes no difference. But I must say, I am increasingly alarmed by the possibility that a laboratory origin would actually suggest something radically different about this virus. And might explain some of the anomalous features that we see, and might have a lot to say about what a wise course of action going forward would look like.

**Heather** 02:15

So maybe we should just flag this and say that I think it was Episode 10, where you in particular talked about a lot of what you saw as some of the emerging evidence that this was, this did emerge from a lab, not as a bio weapon, likely, but as part of normal ongoing research. In the last livestream, that would be number 14, you showed a flowchart that you had made with your estimates as to the likelihood of the various origins. And it's likely that in a future episode, I don't know if it's a live stream or not, that you may continue this coverage, we may as well, but you have plans to potentially continue this conversation. So you are not evading this particular part of it. It's just not the focus of what we're doing right now.

**Bret** 02:57

Right now, I think it's very important that we talk about the nature of that evidence, and I do want to get into it. But I think for people, there are a couple of things that you should note about the public discussion that would tell you why we're so focused on this. One is that people who dismiss what we've done on the podcast, almost invariably call it a conspiracy theory. We have been very careful to point out that this is a hypothesis and that a hypothesis is actually a unknown quantity. We understand how a hypothesis functions, how you would know if it was true. And when something is offered as a hypothesis. It doesn't even mean that the person offering it is a believer that it is correct. It is a formalization of a possibility. And it suggests mechanisms whereby you might establish or falsify its validity. So we've been careful about that. And our detractors have tried to push us into this conspiracy theory buzzsaw. And I would just say, I don't think it's worth taking seriously, anybody who uses the term conspiracy theory to deal with a legitimate hypothesis.

**Heather** 04:01

Yeah, as we've said earlier here. If we try to assess our world through the lens of Occam's razor, also known as the law of parsimony, which suggests that all else being equal, the simplest explanation is most likely to be the true explanation. Then it seems like an easy thing for those who suggest conspiracy to be debunked. But that's not true. Just because you were trying to see to understand the world with the lens of Occam's razor does not mean that conspiracy does not happen. It just means that it shouldn't be your default assumption.

**Bret** 04:34

Right? And, you know, on the flow chart that I presented, there's a pathway whereby this virus emerged as an intentional release. It has a very low probability on it. I don't think that this is likely to be true. There's no evidence for it so far, but on the formal list of all the possibilities, it has to be there. Okay, but let's talk

**Heather** 04:53

about what you and we think the evolutionary implications of what This virus is doing and might come to do our if it was at least partially engineered likely to be hybridized recombinant virus in a lab from to pre existing extent, viruses out there in the world, presumably in a bat in a pangolin.

**Bret** 05:19

Well, I want to say one more thing about the the public discussion, which is the most alarming thing about the public discussion is that there is almost no dissenting opinion to be found amongst establishment virologists as to whether or not this could have come from a lab. And this is alarming because when one looks at the evidence, it's not that it is clear that it came from a lab, but it is clear that it might have come from a lab and that would explain at least the major coincidence of where on earth it emerged. So the absence of that discussion forces those of us who are not establishment biologists to take up the slack and to have this discussion. And really, I feel it as a kind of obligation if they were discussing this, and I saw something that looked like a rational discussion, I might be interested in entering that discussion, sometimes based on evolutionary things that they might be missing. But it's perfectly possible that we wouldn't have to do this. But in the absence of that responsible discussion at the highest levels of neurology, somehow we've got to do this in podcast world, which is far from ideal. Sure. Alright, so let's talk about the question of not if it came from a lab, but what if it came from a lab? What would that suggest about where we are? The thing that is increasingly alarming me, and maybe I should remind people that if I have a scientific claim to fame, it is in the study of telomere senescence and cancer. I advanced a hypothetical model which now has considerable support. That aging is the downside that comes with a protective mechanism against cancers based in telomeres things at the ends of chromosomes. In order to do that work, I had to go through a roadblock, which was that mice did not appear consistent with that hypothesis because they had extremely long telomeres and short lives. And what I ended up hypothesizing, which was later demonstrated in the lab by Carol Greider and Mike human, was that mice don't actually have long telomeres, that this was the result of evolution inside a laboratory environment that nobody had thought to worry about, because they didn't realize that they had created artificial selection of a very intense type.

**Heather** 07:38

May I reword this sentence. The observation that mice have long telomeres was not itself untrue. Except that mice weren't mice, its lab mice, mice that have been bred in and for in laboratories for laboratory research, have long telomeres, but wild mice do not. Therefore it was the category mouse that was an error. And most people who aren't organism biologists, evolutionary biologists don't think that deeply about what it means when you say mouse, you know that it's many, many species or that it might be different depending on population even. But that that is the distinction. It's not that the initial observation of long telomeres in parentheses some mice wasn't true, but that there was a erroneous overgeneralization of the observation in these lab created and now lab studied mice to suggest that it was all mice. That's

**Bret** 08:33

perfectly said. So one of the outgrowth of this is the recognition that evolution in a laboratory environment can in fact be extremely rapid, and has important consequences for the creatures that are the result of it. All right, so now back to the question of, well, what if this did emerge in a lab? Well, one of the things you have to understand about the laboratory work that virologists regularly deploy in the study of things like coronaviruses is that they use a kind of serial passage, which is a technical term for infecting something B cells or living animals with a virus, either a natural virus or one that they've created as a kind of error. And then allowing it to be transmitted one cell to the next, or one animal to the next. And that this uses an experimental process to determine both what the nature of the virus is when it is exposed to tissues that allow it to function. And also, it allows us to see something about the evolutionary trajectory of viruses over time. Now, the question is, it is clear, I believe, or almost clear that this is initially a bat virus that we're dealing with the main bat, bat bat bat virus, probably from horseshoe bats, almost certainly from horseshoe bats

**Heather** 09:58

but does happen regenerator virus, either the actual virus or the certainly the progenitor virus came from a species of horseshoe bat that doesn't live right around Wuhan, but lives

**Bret** 10:08

within a few 100 miles. Yeah, and we always have to leave open the possibility that there could be some other creature with a better match. But from what we know of coronaviruses in creatures, and we know a fair amount, it does look like the core of the virus we are dealing with does come from a bat recently, how recently and by what mechanism, that's what the dispute is about. But if this virus was taken into a lab, and then escaped, just by incorrect handling, let's say but without modification, then this probably says very little about what we're facing, because we're dealing with a virus that could have jumped to somebody in a cave, and it would have the characteristics that the ancestral virus has. On the other hand, if somebody compositive, several viruses in order, probably to study the danger of viruses that might emerge from a cave, if they took a virus, and they turbocharged it to make it especially infectious in order that they could study the process of infection, maybe generate a therapy or a vaccine, then they would have imbued it with characteristics that might actually be very difficult for a natural virus to have come by. There are mechanisms, but they require, as we've talked about previously, they would require, for example, two viruses from two different sources to infect the same animal to find themselves in the same cell, and then to engage in a kind of recombination, which is not impossible, but it's difficult. So that's a very unlikely thing. It may happen. But that's very different than somebody in a lab deciding to take characteristics from here and characteristics from there, and fuse them together and make what amounts to a super virus. But even worse, is the fact that if somebody took such a super virus, and then they went through one of these serial passage experiments, they a would have, I believe, selected for adaptation to the laboratory environment itself. And B, they might have induced a tendency in the virus to experiment beyond what a normal virus would do.

**Heather** 12:11

Let me just pause this for a moment and say, I don't think you even need all of that precursor argument about if they made a super virus that that would render the further selection in the lab through serial passage experimentation, more likely to produce a particularly horrifying virus. But even absent that, absent the production of super virus, all you really need is serial passage experimentation on a recombinant virus that's in the lab that's experimenting iterations of generations in the lab, and you have a situation in which selection as you're about to get to selection is likely to produce a virus that explores rapidly and with very few breaks. So I feel like the bit about if the lab created the superbug, we don't get that. And that actually produces more. That's a big potential break and this logical chain that we don't need to make the rest of the argument.

**Bret** 13:12

Yeah, I believe what you've just said is accurate. The, the compositing of to viruses is unnecessary to the necessity of us figuring out whether this came from a lab through serial passage, because

**Heather** 13:25

but I'm not even objecting to the idea that it was a compositing of two viruses. I mean, it's you know, this pengal possible pangolin spike protein on a sort of virus body that's from a horseshoe bat, doesn't need to have been done in pursuit of superbugs. So that's that's specifically the language that I'm jacking to. That's the thing that's going to be easy to dismiss that you know, that you can imagine that you that you are we know something about what was in the hearts and minds of the researchers who are producing such a thing. Even if it's a composite, it doesn't necessarily have to have been a composite with a particular goal, especially nefarious goal. So I just I just want us to be very careful here that I feel like the the interesting thing that we can add that is that is new. That is that is novel, is the evolutionary analysis of what a law that what a virus that it experienced strong selection in the lab might do, once it then escapes into the world like that is the new thing that we haven't quite gotten to yet. And I think it makes no sense to potentially give ammunition to the would be discredited errors by making an argument about production of superbugs at the lab. We don't know maybe, but that's actually not necessary for the rest of the argument.

**Bret** 14:38

I agree. It's not necessary. We do know a lot about what was in the minds of the people studying these viruses because they published effectively, you know, may not be a perfectly accurate or complete rendering of their thought process, because they were publishing along the way we know a lot about what we were thinking what they were thinking and why they you know, we're inclined to do the research. But anyway, I agree with you totally unnecessary. The serial passage in and of itself will have had a selective effect on the viruses. how extreme in effect? In other words, was there enough time for it to change the viruses? That is uncertain, however, so

**Heather** 15:15

why don't you just say a little bit about what you think the selective effect of just simply serial passage, experimentation on viruses, recombinant are not in the lab might have before we get to them what happens when those viruses release? Well, let's

**Bret** 15:31

start with another system and non virus so you can see the basic parameters. I remember from long ago, when we were actually undergraduates at UCSC. I took a great course with Bob rivers. It was a seminar Bob Trevor's let it and Austin Burt was a postdoc at the time. Austin Burt is a very important evolutionary biologist Trevor's is one of the greats. And anyway, the the issue of consumerism in cattle came up Austin brought it up. And you need a little bit of technical terminology here to understand this. But it's not tough when a mammal it's true for other creatures, but when a mammal creates a sex cell and egg or sperm

**Heather** 16:21

can mirror some or kiasma, frequency kiasma frequency, we really need to go back and clarify because they're two very different terms that mean different things.

**Bret** 16:29

Not really because it's a cosmetic chromosome. But anyway, you're right, I asthma is the right term here. So when a cell reproduces to make sex cells, either eggs or sperm, the chromosomes that the creature that's making those cells got from its mother and its father, actually, the two chromosomes that carry similar information line up together, many of you will remember this from your high school biology class, they line up together at the equator of the cell. And then they swap information so that the sperm carries composites. And the egg carries composites of the mother, the maternal and paternal chromosomes but it doesn't carry the originals, right? It carries, they've been shuffled. And the question of how so these shuffling events are called kiasma. Right? So kiasma frequency is how much shuffling went on between the fathers and mothers chromosomes to make the ones that go into the sperm or the egg. The kasma frequency is itself subject to evolutionary pressure. And the point that Austin put in front of us was that in cattle in particular,

**Heather** 17:36

the coyote domestic domestic cat wild cattle, but domestic cattle,

**Bret** 17:40

I think cattle means domestic But anyway, doesn't matter. But

**Heather** 17:42

this but this the paper, which unfortunately, we could not find yesterday, and we were looking for it suggested specifically that it wasn't in wild Bovis, but only in domestic cattle,

**Bret** 17:52

yep, have an incredibly high kiasma frequency. And the interpretation was that when we exert artificial selection in, you know, in the feedlot, we are looking for characteristics that serve us that may not come together, they may be, you know, maybe that the large animal has a low tendency to produce milk or is resistant to producing milk when it doesn't have a suckling calf or something like this. And so in selecting for components that we want together in one animal, we inadvertently without, you know, long before genes were even understood, we were selecting for high rates of shuffling in these animals, so that an animal that is highly experimental, tends to leave offspring because it brings together combinations of characteristics that are desirable from the point of view of the farmer or whatever. And what it

**Heather** 18:43

means in part for a genome to be highly experimental. To use your language is to have a high rate of asthma.

**Bret** 18:49

Yes, that's one of the ways that you can introduce novel combinations that would be desirable. And so in effect, strains of cattle would appeal to those who decide whether they reproduce or fail to reproduce by producing combinations that are novel and sometimes contain something that's very desirable to a dairy farmer, let's say, well, the same thing will be true of a Coronavirus being passed from one cell to another in the lab, in the sense that whatever the environment of the lab might be, then the cells that successfully pass under those conditions will be the ones that are in the you know, if you go 10 passages before you then look to see which descendants of the initial virus are present, they will be the ones that succeeded under those conditions.

**Heather** 19:40

And unless the lab is specifically looking for stability in viral genome or viral phenotype, then it will be exactly looking for change and therefore be selecting inadvertently in all likelihood be possibly advertently. For for high rates of change,

**Bret** 19:57

right. So if you accept That logic so far, then the result of it is that what we may be facing if this is an escapee from a lab, and the lab was engaged in these kinds of experiments, then what we may be facing is a virus that is more exploratory than a bad bad virus that infected somebody walking through a cave would have been, because although that virus would still have a need to discover new ways of being and you know, in general, these things go extinct pretty quickly, they do sometimes jump to people, which the jangly lab has demonstrated. But in general, those infections don't spread to the globe. So if we created a virus that was adapted to laboratory conditions, that would have potentially some positive effects for us, that would probably be temporary. And it would have some negative effects, the negative effect would be, wow, maybe we've created something highly experimental. And

**Heather** 20:55

that might just be able to spread across the globe, to different populations, to different regions to different climates very, very rapidly. And which, of course, is exactly what we see two different organs, and two different organs. So not just across space, globally, but across space and system within individuals.

**Bret** 21:14

So this is actually why this topic has got me in kind of a dark mood, because to the extent that this virus is teaching us how it behaves, it seems to be quite anomalous, the list of symptoms seems to grow by the week, if not, by the day, the number of different syndromes that we see. I mean, it's even notable that we are calling this SARS, because that was the first thing it looked like. But from the point of view of all of the other things it creates, you know, this is not inherently respiratory. That is it seems to be the way into the body in general, but but it

**Heather** 21:57

seems cardiac, it's neurological, it's blood, it's children, it's old people it manifests differently. And well, not just in different ages and different demographics, but in different populations, which may be an indication of very different strains circulating simultaneously, which we'll get to a little bit later. Yeah.

**Bret** 22:15

So if this is the case, it also on the plus side, and this is a hypothesis, I don't even know if I believe it, but I know that it is worthy of consideration. Yep. It is possible that the and we will get back to why we think this is the case. But it is possible that the difficulty that one has contracting this disease outdoors. That is to say the rarity with which it appears to be transmitted by people in an outdoor environment, is the result of the fact that effectively the laboratory selected for viruses that are very good at being transmitted in an indoor environment. And if that is the case, then I believe it suggests that we have a limited amount of time to exploit its inability to jump from one person to the next outdoors.

**Heather** 23:11

Well on this, I think you've said in an earlier livestream, this would be the case, if it had immediate precursor origin as well aware transmission was likely happening between bats in a cave. Or you've got serial passage experimentation of a possibly recombinant virus in a laboratory. Either way, you've got close quarters, and no UV light, and add add sunlight, add air increase, decrease population density increase space between would be carriers would be transmitters, and the thing seems to have a very much harder time getting between hosts.

**Bret** 23:50

Yeah, and it's actually it's amazing how extreme this effect is. So one of the things you and I have talked about this, there are certain things that are very hard to render graphically. So all biologists of our age, I would say suffer from a bad model of the way neurons function. For example, because a neuron in the brain might be connected, its dendrites might be connected to 1000. other neurons, it's very hard to depict that in any way that looks other than like a hairy cell. Right? It's very hard to, to depict a biotic computer in which each of the things that seem like wires are actually computers unto themselves connected to 1000 other cells at a time. And so we have a bad sense of what a neuron is and how complex the interaction of one neuron with the next might be. Likewise, we have a bad model for how viruses are transmitted. The fact that mean and this is not new. This virus appears highly sensitive to the quantity of virus that one encounters right that does not Fit the cartoons that we've now all seen with a virus reaching a cell and gaining entry now that those cartoons are true, right? As far as we know, a virus enters a cell and coaxes the cell into doing its bidding.

**Heather** 25:15

But but no no cartoon is going to convey the importance of viral load and time to the character single frame cartoons can't do a good job of conveying that or if they do, they can't they won't also convey the you know, what you just suggested that the typical image does I mean, this, this does also point out to the problem. You know, the problem with science education, the problem with textbooks that you know, the reason that textbooks, textbooks tend to have these really simple cartoons, even at the highest levels, even at high level neuro textbooks and Immunology textbooks, right, is that language isn't the only way that we take in information and having information come in, across multiple domains, not just say, linguistically, but also visually, also auditorily can really help synthesize and gain more understanding in the brain. But it's also really easy for those oversimplified visuals in particular, or sound bites, right? Anything that is simple that you can remember without really having to force through first principles analysis, is going to be going to be likely to pop out, and then confuse people into thinking, Oh, that's, that's the truth. That's, you know, science says, Therefore, that's the truth.

**Bret** 26:27

Yeah, the problem is they especially as you point out, the visual stuff takes on a reality of its own that then cryptically informs people or misinformed them. And you'll all be able to detect this in yourselves. If you think about a diagram of the solar system. When we were at evergreen, I always wanted to get a little grant to install a scale model of the solar system, because the solar system isn't anything like the diagrams in a textbook, because you can't do it. You know, if the sun either, you know, if the sun is yay big, and the earth is tiny, and then Pluto is a long walk, right? How do you depict that on a page? Right?

**Heather** 27:10

And it would, you know, on that campus, it would have been possible because it was on 1000 acres of forest. Whereas most places can't even imagine having such a model. And most many, many observatories try this. And you know, you'll run into a planet somewhere in some totally different room where the center of this was far away. But of course, with walls and other exhibits between It, it, it doesn't really make

**Bret** 27:34

the point of strongly you really need to walk to Pluto before you understand. But

**Heather** 27:38

but this is just a suggestion for me now. No, no. Okay,

**Bret** 27:41

believe me, I need you right there. But so anyway, we've departed from the topic. But I'm not even convinced that we understand by we, I mean, the scientific establishment understands why viral load plays the role it does in infection. And, you know, maybe it does, maybe we just don't know, but but there's something there's some system that is dealing with a large number of things, a large number of incoming viral particles successfully in general, but too many viral particles at once or in a short period of time, overwhelmed, it could be the, you know, the macrophages and other general generalist cells are really successful at capturing free floating virus that they don't have particular warnings about, but that they can all be occupied and something gets over the wall. Who knows. But in any case, the the laboratory environment would, in all probability, have favored certain characteristics and to the extent that subways local trends seem something like a cage, in which you might have a bunch of animals who you were trying to infect in order to see what the consequence was for them and what the result was for the virus.

**Heather** 29:07

nursing homes. meatpacking plants. Yeah,

**Bret** 29:11

exactly. So, you know, could this be a dead end and, and irrelevant, it could be but if it isn't a dead end, I can't escape the idea that this is really, at some level, possibly the most important question in the world at the moment is, to the extent that we can get a leg up on this virus by finding out what we know of its nature. If it came from a lab, the people who ran that lab know things that we need to know and I'm not suggesting, I think people try to push ideas to the near the nearest idea that they know themselves, and they synonymous the two we know that. Thinking Fast and Slow would be a good place to hear about this kind of cognitive bias but In any case, I'm not advocating, I'm not even interested in responsibility. If these were scientists working honorably, what I'm really interested in is what might they know about what we're up against. If this if this thing has been selected for the laboratory environment, and one of the things that it that imbued it with was a low resistance to UV light, because it borrowed capacity from resistance to UV light in order to do other things that made a difference in the lab,

**Heather** 30:27

it hasn't it, the hypothesis being it would have been able to borrow capacity for resistance to UV light, because it was experiencing no UV light, and therefore, it suffered nothing. In the immediate environment, which was being selected for right to spell out the argument,

**Bret** 30:43

there would be a trade off, and this would be a cheap place to borrow. Well, if that's true, then what we would expect is over time, as this thing floats around in the world, it will evolve resistancy UV light, the outdoor environment will become more dangerous. One thing that would also be true, is that it would be imperative not to give it that selective signal. In other words, to the extent that today, it might be very difficult to contract this outdoors, I would say that does not mean relax outdoors, I would say it means go outdoors and be very vigilant about the means of preventing it from jumping. So we don't give one of it a hint to give one of these strains a hint about some other way it could be transmitted. Right. So I

**Heather** 31:29

mean, I guess maybe just just spell it out a little bit. I think on the last livestream, we showed a little chart that a doctor had put together so you know, estimating various risks from various activities. And if you've got three activities that are possible, go outside, but physically distance from people you haven't been effectively in lockdown within your home, go outside and be in a group of strangers versus go inside and be in a garden, maybe let's take for you know, outside effectively alone or just with those who you already shared pathogens with outside in close proximity to strangers inside alone, but in a place that maybe has had strangers in it recently, and inside and close quarters, inside and close quarters with strangers is clearly at the moment, given what this virus is doing right now, by far, the way that the virus is most likely to spread, then and outside without close proximity to strangers is by far, the least likely way to get the virus and in fact, we see no evidence that the virus is persisting in any way outside if there haven't been people around. So you know, outside without being in close proximity to other people. It's always possible, you know, the wind spreads. Wind spreads viral particles in strange ways, but the risk is diminished, and they're low. And the health benefits inside me. Both physical, psychological, mental health benefits to being outside are huge. And that seems not just safe, but like the important thing to do. Whereas, you know, outside in close proximity to a lot of other people, or inside a physically distancing, say in a grocery store, both of those have some risk to them. And you know, if you're going to be outside close to the people, you should be wearing a mask, if you're going to be inside, in close proximity to other people, or you know, in a place where there have been people, you should be not touching your face and washing your hands frequently and making sure that if you touch things, you then don't don't touch your face, don't put your hands up to your face. So it's not outside versus inside. Exactly. It's outside in combination with Where could the virus possibly have been? And you know, it's not it's not living on plant surfaces. Right? It's it's not doing that not to say that it couldn't start.

**Bret** 33:52

So this is one of the things that's very troubling about this movement to end the lockdown. And I won't wear a mask no matter what. And all of that is, in some sense, I would be more sympathetic to the contingent that wants to grow to greatly reduce restrictions in what's possible or eliminate them altogether. If their point was Let's be hyper vigilant about being careful, rather than let's behave like the virus isn't that serious? Because at some level, if we, if some of us begin behaving irresponsibly, while others of us behave responsibly, those of us who are behaving responsibly will obviously suffer the cost of giving the virus more landscape on which to experiment. And so at some level, like it or not, we're all in this together. And that forces us to have a conversation that Yeah, I agree it's very uncomfortable, but we really have to, we have to do it.

**Heather** 34:57

So we spent more than half our time I'm on this already, maybe instead of going in order here, you want to jump to the end not because we want to skip everything in the middle of because you've already alluded to it several times. And basically, the evidence continues to mount as we have talked about in several live streams that being outside provides protection against getting the virus both because you're less likely to run into it. Because if you do get it, you're more likely to have to be healthier and be more likely to resist serious illness. And you're also less likely to transmit to others being outside. But this, Zach, we want to put this up as SWAPO, Washington Post, op ed makes many of these points, but it's specifically it's interesting here this is this is the era we live in that it is based on a Twitter thread by this person whose name I have no idea how to pronounce some afraid mujhe civic. I'm sure I'm butchering that, where that's not going the right place. Sorry, Zack, if you want to pull that down. Um, so she I believe it was a physician and a scientist put together a really impressive thread actually, on Twitter, which you can get by linking to this wapo article, which we will put in the in the notes about all of the evidence that's been released. So far, suggesting that actually being outside is is safer. And we should be making public policy decisions based on that, unfortunately, because you and I have both been talking about this since actually, you know, I started saying things like this on social media before we even started our first live stream. That Yes, we need to social distance and really physical distance is probably the better term but we should not nature distance, there's exactly no evidence that nature distancing is helpful. And in fact, it seems to be harmful. But there are there is there's a failure of nuance across the board now. Right? And what we're seeing is people who are finding the lock downs, constraining feel that they are evidence of an authoritarian governing structure, looking for people with credentials, who are of like mind, right, so I don't know, Brett, if this is where we want to go here.

**Bret** 37:22

Sure.

**Heather** 37:23

Okay. So Zack, you want to put this up, we first were aware that Tim Poole who we have we have met we know we like we did. We both did a podcast with him a long time ago. put up a video on his alternate site, not his main Tim cast site, in which the title is Professor make strong case for ending lockdown, which is based on your Brett tweet, which was based on what was a Joe Rogan's conversation with a researcher suggesting that vitamin D was helpful in fighting the virus. And your tweet was just once again, once again saying, guess what being outside is not the problem. Those parts of the policy of the lockdown policies need to change

**Bret** 38:11

not only not the problem, but part of the solution because of the vitamin D connection. If the vitamin D connection holds, then outdoor is actually curative.

**Heather** 38:19

So I don't know what else you want to say about this, just that it's it's unfortunate and alarming that someone who has been in the past truth seeker and a truth teller is using effectively your credential to make a claim to suggest that you are making a claim that is opposite of what you're making that you are not suggesting the ending lockdown is the right move, what you're suggesting what both of us have been suggesting for a long time, is that lockdown needs to be done smart. And that there is no way that any of these policies ever should have included keeping people out of nature areas, so long as they could use them in such a way to keep them physically distanced from other people.

**Bret** 39:04

Yeah, it is important that we not do this, we have to be having a discussion in which nuance is the the rule rather than the exception and being shoved into some known position. In order to get clicks or advanced the ball or something like that as a mistake. We need virologist to be sharing their disagreements with each other about the possible origin of this thing we need to be discussing what it means and we need to be discussing what to do with people being free to advance positions that aren't mainstream without being shoved into one of the mainstream positions and, you know, never occurred to me, it even did not occur to me that I was going to be understood to be advocating an end to lock down. Right? Because

**Heather** 39:52

when it's I mean, it's been fascinating in a grim sort of way to see what some of the responses have been that you know, See, we're on a you're actually on a call when I saw this. So I tweeted it out first asking Tim saying, look, we respect you, man, we'd like you, this is an error, please fix it. We we believe you to be more interested in truth that clicks. Unfortunately, it's now something like 24 hours later, and it's not fixed. And both in response to my public objection, and to yours that just came a couple hours later, simply because you were you were busy at the time. We have both seen a lot of pushback from people saying, What's your objection? It's fine. Yeah, this is so you know, you listen to the video, like, you know, the title of the video and the thumbprint or the thumbnail of the video, both say specifically are both appear to be borrowing your credentials using your authority, which, you know, both of us always tried to hand our authority away in the classrooms, they don't trust us, because we come here with PhDs dressed as be, you know, ultimately, come to trust us because we have proven ourselves trustworthy, or seek information elsewhere, if you don't come to trust us, but continue to question everything we say, you know, like, like we say all the time you question all roles are the good ones, and work against the bad ones. This is a question of lockdown never should have included these rules. And a number of people are saying, well see, you're just talking about using lockdown. Like No, this is not the argument. lockdown shouldn't have looked like this in the first place. And there are several aspects of lockdown that especially in in the vast majority of places in the world, seem to still be necessary, given continuingly increasing rates of infection and hospitalization.

**Bret** 41:35

I would point people also, if they go look at the tweet. So that tweet got retweeted and liked a bunch I think which which one the one that Tim is invoking here. So Tim is referencing a tweet of mine.

**Heather** 41:51

So should I pull that up? Sure, if you can I get that.

**Bret** 41:55

But that tweet was liked by a wide range. Now I obviously can't look at 10,000 likes, but I can see the blue checkmark likes, and it appealed to people across the political spectrum, right, from people who are on the far left to people who are on the far right, it resonated with people, which tells me that this is a perspective which is waiting to be given proper voice and in any case, to have it shoved into one of the naive perspectives, either one of them either, you know, keep the parks and beaches closed that perspective or the end lockdown now perspective, both of those are uninteresting, and they're both wrong. Yeah. Here it

**Heather** 42:42

is what you say your quote tweeting Joe Rogan who says vitamin D may reduce susceptibility to COVID-19 associate lung injury based on a stream that he did, I gather on May 14, you say it is insane that as the evidence for vitamin D is protective effect mounts, and though it appears the virus is very rarely transmitted outdoors, we continue to instruct people to stay indoors where Cove two was easily transmitted and where they can't make vitamin D. And you know, I read that again now and I see okay, if I'm trying, if I'm trying to steal man, what I really believed to be mostly bad faith takes on the other side, but I'm trying to steal man it maybe you could read this as we continue to instruct people to stay indoors as Yes, we've been doing it but we need to stop that. And this is you know, this is the read that people have been that that people who don't seem to understand the nuance here have been taking, you're suggesting he is lockdowns? Well, no, you're not suggesting he's locked down here suggests we're both suggesting do lock downs, right? And get rid of immediately all of the bad parts of the policy. Yeah, I

**Bret** 43:43

mean, the point is locked down sucks to the extent that we need it for epidemiological reasons, let's make it as painless and healthy as possible. This is an obvious place that we could make things better. Now I do have one regret about my tweet, which I didn't even occur to me until people started calling me out about it, which is the word instruct, I don't believe that we are actually instructing people to stay indoors per se. There are examples of people who've been told to get out of their yards and things like that, but those are going to be rare. What we are

**Heather** 44:14

doing late, they're very common in some places in England, there is a lot of that,

**Bret** 44:18

okay. What we are doing though, is we are keeping the places that people might go outdoors closed in many locations, and that is causing those who do out go outdoors to concentrate. So it's the same kind of mistake is between the local trains and the express trains

**Heather** 44:34

and reducing your city size.

**Bret** 44:36

And it is also not offering people the kinds of opportunities outdoors. So at some level, commerce is dangerous in many regards. There are certain things that can be made safer and there are certain things that are necessary but commerce tends to concentrate people inside of buildings, whereas going to the park going to the beach, you know taking a hike on a trail. Those things, people To be safe and healthy. So in any case, maybe we've said enough enough about that, can I go back and correct one thing before people take me to task? Okay? I do not mean to imply that coronaviruses have crossing over in the same sense as mammals, what they do have is mechanisms for exploring design space that are analogous.

**Heather** 45:22

Good. Okay, so what we were going to talk about, in part, stemming from the original discussion of explore modes today was why in this particular environment censorship, which is always a problem, may be it is particularly onerous now. And I feel like you sort of did that you said, right now of all times, we need access, everyone needs access to all the information so that smart people everywhere can sift through everything that's going on. And given you said last time, where are the neurologists who are who are disagreeing with the party line? In part, we are beginning to see censorship across all domains. And so it's becoming harder and harder for people to find the information. So we just we just had a few examples here, right? We have. This is now a while ago, actually, almost a month ago on April 18. Susan Wojcicki, who's the CEO CEO, I think of YouTube, said on CNN is, interestingly named reliable sources podcast, that YouTube would be taking down any videos that go against the World Health Organization recommendations, or are, quote, medically unsubstantiated. Obviously the who has royally screwed up in a number of places in the treatment of this crisis? I'm not, I'm not I'm not arguing that they haven't tried to do their best, or at least many of them haven't tried to do their best. But the idea that the who is the arbiter of not what it is the policy book policy should be happening, but what information is allowed to be spread to the public by people who are interested in spreading information is dangerous, at best.

**Bret** 47:02

Well, it also goes back to something you said, I think, on our last live stream, which was science is not set and forget. And so the idea that there is some authority that understands COVID-19 well enough to offer advice that is so solid, that it is beyond disagreement is preposterous on its face, and to have the major platforms playing with this kind of analytical authoritarianism is beyond lethal, who the hell do they think they are, that they understand this so well, that they're going to tell us what other possibilities might turn out to be true? That is absolutely insane. And, you know, we all get it. There's garbage information out there. There's there's not a person connected to the internet who doesn't know that, right? You are not the arbiter of where that border is. This is the same problem that we have faced in science forever. There are a lot of Kooks, and among them are people who see something ahead that the rest of us don't yet you can't shut down the garbage without shutting down the people who know what's coming. So stop it.

**Heather** 48:10

Yeah. And we talked about this in was it Episode 11 choose your own Black Mirror episode. When we specifically were doing a takedown of the current county doctors video, their their analysis was flawed across in so many ways that it was really hard to, to watch it without, without taking pages and pages of notes about where they got things wrong. But as you as we talked about at length in that episode, as I was in the middle of watching, it had taken a break for us to have dinner, YouTube took it down, and then they took down another one and ended up on bit shoot where it's fine to ball to this day as it should be right like as it needs to be. So these you know, that was another example of you know, certainly much of what they were saying was medically unsubstantiated. And I would argue not not going to be not going to end up being appropriate for the evidence. But that doesn't mean that we shouldn't have access to it. Similarly, we've got now the pandemic documentary, which we spoke a little bit about last time and the evidence against that, but that's been taken down. And you know, we're now talking about examples of videos that we think are so deeply flawed, that yes, some people will take away wrong and wrongheaded ideas from them, but they need to be out there. So we've got the current county doctors, we've got the pandemic documentary, we also now just in the last day or two I've been hearing a lot about this Dolores Cahill don't know if I'm pronouncing her name right. This physician I think, out of Great Britain somewhere who much like those earlier videos seems to be not hypothesis driven. Not even data driven, but conclusion. driven, she's got some conclusion, she's got, frankly, some political motive that she's shooting for. And, and it, she doesn't appear to be an honest broker. But that doesn't mean that we shouldn't be able to see what she has to say. So just because this is this question about her has come at us a lot in the last day, I want to just put up a screenshot of this video that you can put up now Zach, which and again, we'll put the URL for the bit shoot video. Here she is. This is her rendering of the difference between Corona and a bola to indicate the corona is no problem at all. And there are problems in almost every cell, you know, age range most affected for Corona over 80. Well, if you ask someone in late January, that was what we thought, but I don't think anyone thinks that's true. Now age range not affected children. Nope. Wrong, our masks effective to stop spreading infection. No, really. So and then maybe worst of all is up at the top. And this is just mathematical sleight of hand. With regard to the death rate. The denominator that she uses for a bola is out of 10,000. And the denominator that she uses for Corona is out of 1000, which makes the overall numbers seem like they're way, way way lower for Coronavirus than for Ebola. And that right there tells me even even if she was legitimately confused about the contents of every other cell, anyone with college level mathematics, or I would hope middle school level mathematics, but anyone who is licensed as a scientist who willingly puts numbers up that switches the denominators, and which therefore changes the read on what the death rate is, is not up to any good. Still, this should be up they should be available. And the fact that it's on bit shoot and has presumably been, you know, thrown out of YouTube is again more of the problem.

**Bret** 51:59

Yeah, it's a it's a terrible problem, I would suggest for people trying to figure out how you deal with questions like this without getting pushed into one of these buzzsaws or another. There are certain hallmarks that are going to be important one, when people make an error, did they come back and correct it? Do they tell you I made an error? And here's what it was? And here's the truth? Where do they leave it up? Are people prone to embrace every conspiracy theory? Or are they selective? Do they talk in terms of hypotheses? And are they very selective about the ones that they give credence to? I would just point out that no matter what your belief system is, it ought to be true that most conspiracy hypotheses are false. So if most of them are false, then your tendency to reject them ought to be high. And if it isn't, that says that your quality control isn't very good. But what you have here is a case in which we are simultaneously pointing out errors in other people's work and advocating that that work remain available. And this has got to be where the platform's land, otherwise, they're going to create a nightmare. And they already are.

**Heather** 53:16

That's right. And just one more thing on this before we're gonna try to get to two more topics before you know a few minutes is up here. But the preprint servers which have before this global pandemic, been a place for people to put papers in advance of them being usually printed as opposed to accepted, but maybe even just as they have. I don't actually know what the various rules have been for when papers end up in preprint service but at the moment, these have been sort of the clearinghouses for anything that you've got that you that is relevant to the modern moment with regard to Coronavirus. If you've done a piece of experimental research or review paper you can put it up and your show this for a moment sec. Nature publishes now a week how swamped preprint servers are blocking bad Coronavirus research. Now that word swamped suggests that they just can't handle it. And that's of course, editorial against sleight of hand by nature, when actually what the preprint servers are trying to do is cover their asses and get rid of some of the maybe less savory or less. I don't even know what politically correct medically correct, whatever it is, results that they're not liking. So even the preprint servers now are doing a sort of behind the scenes edit on what it is that we can see.

**Bret** 54:35

Yeah, it's a part of what Eric calls the distributed idea suppression complex the disk Yeah, maintains the gated institutional narrative. And so here nature which is like the, you know, one of the pillars of the gated institutional narrative is trying to shut down a mechanism through which other people are exploring ideas that nature doesn't want to touch.

**Heather** 54:59

I mean, nature is not shutting it down, nature's it's just nature's headline that Satan is

**Bret** 55:03

broadcasting this and it is characterizing it as swamp servers, which I would point out is a an echo. We have peer review, in part, because on paper, there was some need to sort quality from non quality because there's a limited of how much paper and ink there is. It's expensive stuff. That wasn't the entire reason. But that's part of the reason. In a world of electronic journals, this is no longer necessary. And anyway, nature is now trying to characterize the preprint servers is having limited space. And that's the reason they need to do this, which is of course nonsense.

**Heather** 55:42

Okay, I think we have to choose between these, either talking about the theater, Theodore Roosevelt aircraft carrier, or the T cells found in COVID-19. Patients bode well for long term immunity, which which are they should we

**Bret** 55:53

go they are unfortunately connected. So let's try to do it quickly.

**Heather** 55:57

So we have all I could find at the last minute here is an NPR story, suggesting that what we've seen, we've seen indications a few places that the Theodore Roosevelt aircraft carrier, which we've talked about in earlier live streams, and had several people who had tested positive, I don't remember what the number was, was for more than five, but five servicemen who had previously tested positive had been tested negative, and it's been many weeks, I think, have tested positive, again,

**Bret** 56:26

tested positive after testing negative to a very high standard. I think there's something over 1000 cases and Zack, you do have the Navy's I think the Navy Times report on this. Can you put that up? Okay.

**Heather** 56:40

So this is a very scary possibility. And we've alluded to it before, we don't know if it's true or not. You know, of course, one of one of one of the implications of this could be actually, those negative tests that the servicemen got in the interim, were wrong, and they were positive the whole time. But if true, it means that the possibility of reinfection exists, which is to say that having had at least one strain of sorry, scurvy, two does not protect you against possibly other strains. And of course, no one is talking about the distinction between strains, we should spend some time on that in the future. Or reemergence sort of in the style isn't exactly yet but you know, for for me, the model I have in my head is vivax malaria that tends to hide out in the liver, not be detectable by malaria tests while it's hiding out and and the person who's carrying it is asymptomatic. But when it comes out of the liver, the person becomes symptomatic. And that's when in you know because Malaria is vectored in from mosquito bites you then then you can transmit to other people so reemergence? Who knows where it's hiding, if that's the case, or reinfection? Yeah,

**Bret** 57:49

both of these are possible interpretations. as you point out, it could also be erroneous, but this is a very frightening possibility, and those who are pushing a reckless I don't want to say agenda but are proposing a removal of lockdown. And basically letting the virus run its course are creating a much greater danger if either one of these things is true if either there's no immunity, long term immunity generated by contracting SARS COVID to or it hides out in some tissue and re emerges periodically. Both of these would be very bad outcomes.

**Heather** 58:34

Okay, so the second thing, that the final thing that we wanted to talk about before taking a break, is this science report. So this is again, a reporting of about some other research that has been done. So if you would show it, please. T cells found in COVID-19 patients bode well in quotes for long term immunity. And this, this is going to require a little bit of immunology to parse, we also have the the original papers that this paper is citing. I don't know how much we want to spend on this.

**Bret** 59:06

Well, I think that this story actually buried the lead. So I don't maybe I'm just off here, but I don't think it's very surprising at all that T cells that react to SARS Cove to are found in people who've had these infections, that would be absolutely expected.

**Heather** 59:29

That isn't certainly at least within a few months of home. But in fact, it is the longest possible moment that people could have been infected with this virus at this point.

**Bret** 59:37

Exactly. So it's hard to imagine that this would unfold without T cell involvement and so that there would be some selective reactivity by these T cells. The more important thing was that it appears exactly

**Heather** 59:50

my computer that it's now just

**Bret** 59:55

chill. Some people appear to have reactivity who have Never had SARS Cove to know that could be one of a number of things, it could be that they have had it and the tests are incorrect, which is a possibility we should spend time on at some point. But it is also possible that the reason that some people who've never contracted this virus do already have T cells that react circulating in their systems, his exposure to prior Corona viruses, especially the for circulating cold viruses. So there are four Corona viruses that circulate people get them regularly. These are seasonal cold viruses. And so to the extent that these are relatives and immune system that has seen these cold viruses, then react with some specificity to source code.

**Heather** 1:00:45

So let's just put this up. This is one of the papers that the science news report is responding to. And I think that that is exactly the interesting possibility there, especially in light of the unfortunate meme that is now beginning to circulate that Corona viruses do great damage to humans, but then they disappear, right because SARS one seems to have disappeared, and MERS seems to have disappeared. Well, there are these four other circulating coronaviruses, probably many more than that, but four named circulating coronaviruses that produced the common cold that have been circulating for years. They didn't disappear. They're not just disappearing. So is there something different about this one? Compared to SARS, one and MERS versus the other Corona viruses that are circulating and widespread and effectively endemic in the human population? Presumably there's something different, but the idea that we are certain that this one is more like more likely to be like SARS one and MERS, then like the higher number of endemic circulating coronaviruses is seems like a very dangerous position

**Bret** 1:01:53

to me. Well, I think this actually brings us back full circle, because one of the reasons that one might expect this to behave more like the common cold coronaviruses and less like the SARS and MERS example that we have is that this one may have been turbocharged by human tinkering, presumably with good intent, but human tinkering that turned this into something that spreads like wildfire. And so in some sense, the reason that SARS and MERS died out is they were not particularly well adapted to leap between people. That's obviously not what we're dealing here. And to the extent that we might be dealing with a virus that has been induced to experiment at a high rate, and therefore will quickly learn how to defeat measures that we deploy, we may be in much more serious trouble. And we should not take SARS and MERS as the expectation we certainly don't know enough to imagine that that's the trajectory we're going to face here.

**Heather** 1:02:55

That's right.

**Bret** 1:02:59

All right. Have we covered it and is it time to take a break and then return with a new link you will find it in the description to this live stream there will be a new link. We'll be back in about 15 minutes to answer two Twitter questions and as many Super Chat questions as we can get to. Alright, we're looking forward to it. See you soon.