00:00:00:00 - 00:00:32:04

Clare

Hello and welcome. I'm Clare and you're listening to Microbe Talk, the podcast by the Microbiology Society. The Microbiology Society Annual Conference 2024, taking place in Edinburgh, is less than a week away, but if you can't wait for the exciting microbiology content, this episode of Microbe Talk might just tide you over. For this episode, I'm joined by Dr Claas Kirchhelle from University College Dublin.

00:00:32:06 - 00:00:55:11

Clare

He's a historian of bugs and drugs. He researches the history of microbial environments, public health and antibiotic and vaccine innovation and regulation. Claas will be giving the hot topic lecture at this year's annual conference, which is called ‘Fecal Flows A very Short History of Microbiology Sewers in Britain's rivers’.

00:00:55:13 - 00:01:10:22

Clare

Ahead of his lecture, I spoke to Class to find out how he's feeling and to pick his brain about his intriguing research area. I wanted to find out not just what microbiology can history or history can do for microbiology.

00:01:10:24 - 00:01:23:20

Dr Claas Kirchhelle

Hi, I'm Class Kirchhelle. I'm an assistant professor at University College Dublin, where I research the history of infectious disease antibody ticks and vaccines on bacteriophage and microbial environments.

00:01:23:22 - 00:01:42:13

Clare

Amazing. And so, yeah, we have you, obviously on a microbe talk to talk about your upcoming hot topic lecture annual conference. And I think it's great to start from the beginning. Really. How did you feel when you got the contact to say that you have been invited to speak at a conference?

00:01:42:15 - 00:02:07:11

Dr Claas Kirchhelle

I was obviously delighted. So I've been in my research working quite intensively with microbiologists for a long time, and it's always been an absolute joy to engage with the community because they're so open towards interdisciplinary work. So it was both really exciting to get to share some of my research there, but also a bit daunting, you know, to see how the wider community reacts to a historian teaching, teaching microbiology.

00:02:07:11 - 00:02:10:07

Dr Claas Kirchhelle

I guess like the history of microbiology in this context.

00:02:10:09 - 00:02:21:19

Clare

Yeah, but I think say to I say before I get ahead of myself and I lastly, the questions and could you briefly explain what your hot topic lecture is about?

00:02:21:21 - 00:02:29:00

Dr Claas Kirchhelle

So it's going to be called fecal flows. I was I was tasked to talk about Dirty Rivers. I guess that's a hot topic in the UK at the moment.

00:02:29:02 - 00:02:29:13

Clare

Yes.

00:02:29:13 - 00:03:07:06

Dr Claas Kirchhelle

And I thought, you know, there are obviously many ways in which rivers can get dirty, be it industrial pollution or human pollution. But obviously the human pollution aspect of it relates the strongest to my own research. So I thought it combined my interest in typhoid with my interest in microbial ecologies and really talk about the longer history of humans and specifically British humans relationship with their rivers, how they've managed them, but also how this engagement with the broken ecologies of rivers, which have been a mainstay over the last 200 years, really have shaped the evolution of microbiological research in the UK.

00:03:07:08 - 00:03:16:23

Dr Claas Kirchhelle

And I've also really driven in insights into ecological dynamics, but also potential solutions and biotechnology applications coming out of this river system.

00:03:17:02 - 00:03:23:09

Clare

Amazing. So it's not just talking about the past as well, it's about how the past inform the future. Is that right?

00:03:23:11 - 00:03:52:11

Dr Claas Kirchhelle

Yeah, I guess. I mean, historians are always a bit careful about saying, you know, there are super easy lessons to learn from history because usually people have already learned those. But it's about really gaining insights from these longer term path dependencies that have been established. So it's perhaps breaking down unrealistic expectations for solutions, but also warning against short termism when it comes to shaping fixes, you know, going for overly financialized solutions to managing public goods in the UK.

00:03:52:13 - 00:04:17:16

Dr Claas Kirchhelle

And I think all of these these discussions are really pertinent at the moment from a policy perspective. But again, I think the lecture, what I really hope to do with these is to to integrate this talk about rivers as broken ecosystems, also with a deep dive into how microbiologists have engaged with this environment. And you know, what kind of insights and what kind of applications have come out of it and exciting.

00:04:17:16 - 00:04:26:13

Clare

And you mentioned kind of think a bit of nerves about speaking to microbiologists. And could you talk a little bit more about that?

00:04:26:17 - 00:05:00:11

Dr Claas Kirchhelle

I mean, I think that beauty of of any interdisciplinary engagement is that you never completely know what the other side will take home from from your own side in terms of your own expertise and also what kind of questions you end up getting asked. So again, I've collaborated with parts

of the community for quite a while now, but I think having such a large audience and such a diverse audience within the microbiological community means that it's difficult to know the reactions to it in terms of really just the questions, the impulses I get back out of it.

00:05:00:11 - 00:05:07:20

Dr Claas Kirchhelle

So I think that's that's that's part of the really exciting part of giving this lecture.

00:05:07:22 - 00:05:16:15

Clare

So I'm also interested to find out about you. What led you to this specific area of research.

00:05:16:17 - 00:05:45:09

Dr Claas Kirchhelle

Chance In many ways I was I trained a trained very classically as as actually admitted evil historians. And when when doing my undergraduate training in Germany, I became absolutely intrigued, especially in the medieval periods, about how how vulnerable societies are to their environments and how societies in turn shaped those environments. So there's this endless interaction, this endless evolution of, you know, human cultures and environments around them.

00:05:45:11 - 00:06:09:10

Dr Claas Kirchhelle

So that got me really interested in in environmental history and a few chances. I was fortunate enough to obtain a course that in Germany, what was then called the Rachel Carson Center for the History of Environments, I've been a modern historian, and long story short, after going to the U.S., I came to the UK to study and got a Wellcome Trust grant to study the history of antibiotics, regulation and resistance and food production.

00:06:09:15 - 00:06:29:19

Dr Claas Kirchhelle

Okay. And initially did that really classically just, you know, the kind of politics of it, the economics of it? But I increasingly got drawn into this microbiological data behind it, but also this this rapid evolution of microbiological knowledge in the 20th century. And I endlessly read the same thing about phage types, and they had no idea what phage types were.

00:06:29:19 - 00:06:59:01

Dr Claas Kirchhelle

So, you know, I started looking upwards at bacteriophage and got sucked into this world of how people in the 20th century start making sense of these incredibly complex microbial environments around them and how it's not a linear, heroic process of, you know, knowledge accumulating and people getting better and better at managing this. But actually how it's often ecological crises or collapses that actually lead to insights about things that have gone wrong, excessive stresses, etc..

00:06:59:03 - 00:07:27:07

Dr Claas Kirchhelle

And in many ways, that's also what this lecture is about, is that, you know, microbiology, it's opening the door on an incredibly complex ecosystem that is in and around us and how humans have eternally tried to make sense of that and also to to to manage this without wrecking everything around them. Sometimes we've been more successful and sometimes we've been less successful in doing that.

00:07:27:09 - 00:07:31:17

Dr Claas Kirchhelle

And I think with Rivers where we're, you know, in many ways back again at one of these moments.

00:07:31:20 - 00:07:56:05

Clare

Yeah. Because it's, you know, multidisciplinary research is again, another hot topic at the moment, isn't it, about how researchers can collaborate together. And you did have this kind of like funneled thinking of only within your own sort of research area and that I would say that maybe history isn't necessarily one that that name usually comes to mind when you think about microbiologist collaborating.

00:07:56:07 - 00:08:00:16

Clare

Why do you think that's important from your perspective?

00:08:00:18 - 00:08:29:08

Dr Claas Kirchhelle

I think because microbiologists are becoming increasingly involved in writing history themselves. And I think that since the last 10 to 20 years with metagenomics, but also the phylogenetic revolution taking off a huge part of the microbiological community has really become engaged in thinking about long term history, long term evolutionary trends. So the goal is in many ways to to help microbiologists be critical about the metadata.

00:08:29:08 - 00:08:55:18

Dr Claas Kirchhelle

So to avoid sampling biases, but at the same time, by tracking the history of these microbial flows that have reached the freezers of the microbiologists and working with, we can start linking the that the genomic data that we're getting out of the microbes with specific selective events, specific individual crises such as mass displacement of populations, the introduction of a new antimicrobial, the mass production or falling prices of specific antimicrobials over time.

00:08:55:19 - 00:09:16:21

Dr Claas Kirchhelle

And so what we end up getting is a much richer history of microbiology and microbiota and the 20th century than we could achieve if it were just one discipline working by itself. I guess that's where I see the niche of the historian with the of the microbiologists coming together, you know, really exploring exciting new terrain.

00:09:16:23 - 00:09:39:23

Clare

Yeah, that's really, really interesting from kind of, I suppose, a complete non microbiologist myself, as I suppose a lot of microbiologists might be forgiven for thinking, Well, data is data and scientific data. Is it different? I suppose, to kind of historical data because that can be has other interpreted it in the wrong way or it could be incorrect.

00:09:39:23 - 00:09:59:19

Clare

But I think it's really interesting what you were saying about the marriage of them together and that actually microbiological data could also be kind of bias in certain ways. And that's that's really interesting. And have you come across it in the past where perhaps the historical data has gone against what we found that what the microbiological data says.

00:09:59:21 - 00:10:28:13

Dr Claas Kirchhelle

Yeah. I mean, to give you two practical examples of how things working either way, so much of biological data challenging historical accounts of disease and historical data, perhaps raising some doubts about the metadata that scientists are using. Yeah. One is, is the classic case nowadays of sequencing of in the past pestis leading to new chronologies of the expansion, but also really pushing our knowledge of different routes of plague transmission, not just from the east to the West.

00:10:28:13 - 00:10:57:06

Dr Claas Kirchhelle

So this old orientalist cliche, which many historians were going on about, but also leading to new insights about perhaps the persistence of different plague reservoirs, specifically in Europe. And this is what we've come across with archeological investigations of plague cemeteries, but also as a result of that, that phylogenetic sequencing of DNA that that was captured from these sites, really challenging existing written down chronologies of the plague as contemporaries experienced it.

00:10:57:06 - 00:11:23:11

Dr Claas Kirchhelle

And I think specifically with regards to the history of the Black Death, but also the Justinian plague that has been significant writings that have resulted from this new hard genomic data coming in. Now from my site. I work a lot on typhoid and I've worked now quite intensively with answer to Pasteur, and they've got a fantastic collection of very large culture collection of typhus samples dating back to the early 20th century.

00:11:23:13 - 00:11:51:06

Dr Claas Kirchhelle

And one of the things that we've been doing this, we've been looking at how this archive was composed and when you're sequencing it, how representative the samples actually are of why the typhus environments during this time. So in the French colonial context, colonial officers were sampling in hospital sites. These hospital sites, they weren't accessible to the wider population, They were highly urbanized where they were taking these samples from.

00:11:51:12 - 00:12:13:11

Dr Claas Kirchhelle

So as a consequence, it limits our ability to actually see how typhus looked outside of highly mobile urban centers in rural areas where it might have been persisting in very different ways. So it's being able to be critical of these sources. Also, perhaps to read how different crisis events might have impacted what we're seeing in the final genetic data.

00:12:13:13 - 00:12:37:15

Dr Claas Kirchhelle

So, for example, when we look at typhus samples from Vietnam in the second half of the 20th century, we're dealing with a lot of displaced people coming in first from the north to the south and then from the south dispersing to other areas. So it's about being able with historical data, with other records like demographic records, to reconstruct those flows of people, to then interpret critically what we might be seeing in terms of the phylogenetic data points.

00:12:37:17 - 00:13:01:08

Dr Claas Kirchhelle

We're never really dealing with many of them. It's not as though we have hundreds of samples from this time. We're talking about how to make sense of five or six individual data points for one area per decade. So having this rich historical context is absolutely key. And perhaps you just end on another example is historians are also really good at finding collections that might have been ignored.

00:13:01:13 - 00:13:28:14

Dr Claas Kirchhelle

So in the World Federation of Culture Collections, we only have a very, very small sample of collections for the catalog globally. And the same is true for for the international reference collections. If you're knowledgeable about the history of public health and who's doing what at different points in time, you often quite well-placed to say, Well, this seems to be a highly relevant collection in this location.

00:13:28:14 - 00:13:39:04

Dr Claas Kirchhelle

Can we go there and perhaps see if there's still a freezer robbed of if people still have records of these older sequencing efforts or phenotypic typing efforts?

00:13:39:06 - 00:13:51:16

Clare

So does that potentially track it back slightly? So are you talking about kind of your particular interest in is it like the origins of typhoid, the history? What's your kind of interest there?

00:13:51:18 - 00:14:17:13

Dr Claas Kirchhelle

So I think with Tifr, the really interesting thing about Typhi is, is that it's human restricted. So if you look at where typhoid is going, you're always looking immediately at human history. And in the 20th century you also looking at the acceleration of antimicrobial resistance for EMR over time. So what my personal dream would be would be to treat the microbe as an archival document.

00:14:17:13 - 00:14:54:24

Dr Claas Kirchhelle

You know, I open it and I see inscribed within its codes certain selective pressures or stresses that human societies have imposed on their microbial environments and that's doing that intense working closely together with microbiologists to get a representative sample of these different microbes over time, you know, in different locations where I can reconstruct the stresses and then see how the resulting data either confirms or doesn't confirm my hypothesis is about specific selectors and that environment being, you know, anthropogenic selectors during this time.

00:14:54:24 - 00:15:17:08

Clare

So and so obviously you can go through and there are clues within the genome of the microbe as to kind of how they evolve that. You also mentioned about kind of archival samples I'm assuming you're talking about is is two separate kind of investigative techniques, right? Or are they marry together? Like how does that work?

00:15:17:12 - 00:16:03:21

Dr Claas Kirchhelle

So it's complementary. Usually focusing on one thing leads to research on the others. Another thing that we can start doing is and this is now thinking about my interest in bacteriophage is that we can stop looking at where lost collections might still be. Phage are remarkably stable if preserved even outside of freezers. And so by looking through the historical records, seeing who was, for example, using bacteriophage typing at different points in time, I stopped getting quite reasonably informed guesses of where lost typing, phage might still be, but also bacterial reference strains on which these typing phage What trains Pasteur together?

00:16:03:21 - 00:16:28:20

Dr Claas Kirchhelle

At the moment we're trying to identify many of these samples of typing phage and the bacterial host strain to lay an account of whole strains evolution over time. So to reconstruct how phage

are driving bacterial evolution, but also to see how bacteria, efficacy and drugs, phage, evolution, etc.. So that's, I guess an interdisciplinary question that we can answer.

00:16:28:20 - 00:16:56:01

Dr Claas Kirchhelle

We're history being able to find these collections, being able to understand where they came from when they were created, helps improve biological data. And for the historian, what's super interesting is also that by reconstructing these flows, I get the history of 20th century microbiology roots of microbiology needs microbes to work with. So by reconstructing these flows of microbes from different territories over time, you know that transfer freezes over time.

00:16:56:03 - 00:17:05:01

Dr Claas Kirchhelle

I end up actually reconstructing how microbiology is, why the disciplined public health system evolved in the 20th and 21st centuries.

00:17:05:03 - 00:17:28:22

Clare

Wow. That's so interesting. And it's great to hear you talk about how the disciplines are informing each other and that there's lots to learn. Either way, I think that is a two way street and are helping each other, and I think that's really fantastic. And a cynic might say, and this is not me at all, I promise a cynic might say it's so what?

00:17:28:22 - 00:17:46:17

Clare

Like you found out about the history of microbiology and these specific kind of diseases, microbes, A cynic might be like, what? So great, That's great for history's sake, but what does that actually mean for microbiology today? And what would your answer be that obviously rubbish question.

00:17:46:19 - 00:18:17:22

Dr Claas Kirchhelle

It's not a rubbish question at all. History is not a science, right? So we deal with stories, we deal with them in a critical way, We deal with them in an empirical way, but we don't get to go back in time and pose hypotheses. You know, we don't get to rewind the clock and conduct an experiment. So we are dealing with a very different form of data from the hard data that we're

getting, for example, from genomics that being said, I think two things are very important to appreciate.

00:18:17:22 - 00:18:41:03

Dr Claas Kirchhelle

That is obviously that's the hard data from microbiology changes quite a bit with technological revolution going forward. So going back ten years time, for example, previous molecular clock dating, you know, all of these things are also subject to change over time. So it's not as though I think science is delivering us with data that eternally remains. Yeah, new technologies, new ways of approaching it need to shift.

00:18:41:03 - 00:19:14:02

Dr Claas Kirchhelle

So there's also a bit of flux there. But perhaps more importantly, and this is where history can, I believe, really help a more critical, more equitable microbiology evolve, is that history can show that microbiology, just like every other science that's been has been subject to structural inequalities. Yeah, when it comes to how we read the world, how our own values inform the questions we're asking, but also informed the values we assign to data.

00:19:14:03 - 00:19:36:10

Dr Claas Kirchhelle

To give you a nice example of this, one of the pieces of research that is coming out right now is based on going back to lots of the phenotypic typing that was done in the fifties and sixties and seventies of typhus strains when people were really trying to understand what is normal, what is a normal universal strain of hyphae that we can use for vaccine design and for diagnostic design.

00:19:36:12 - 00:19:45:17

Dr Claas Kirchhelle

Now to ask you a very simple question where do you think microbiologist at the time viewed normative universal strains should reside?

00:19:46:06 - 00:19:49:12

Clare

will be like Europe and England, Right.

00:19:49:14 - 00:20:24:15

Dr Claas Kirchhelle

Exactly. So what we get is a phenotypic type assignation of universal or cosmopolitan strains which have to exist in Western and North America and cannot and so so no universal type can be ascribed if these strains do not exist in Europe or North America. Yeah, so there's no correlation at all with overall incidence rates and overall disease burdens, which leads to the selection of a strain, the so-called quail strain that has been used to calibrate both diagnostics but have also been used as the challenge strain for all vaccine experiments since then.

00:20:24:15 - 00:20:50:19

Dr Claas Kirchhelle

So that strain is not representative of trophy diversity in the high prevalence areas of the world. And yet microbiologists, it's now described as well-characterized. But why is it well characterized? But because it's a strain that also impacted white bodies during that period. So these structural aspects, these structural biases are encoded in the taxonomies we're using. They're encoded in the well-described strains.

00:20:50:19 - 00:21:13:12

Dr Claas Kirchhelle

We're being handed down from history. And they're also encoded in the archives. Right? So if I now do a retrospective sequencing file, a genetically of microbes back in time, I'm only dealing with the microbes that were there where rich enough microbiologists were there, you know, who could sequence them and then pass them back to freezers or other storage facilities in Europe.

00:21:13:14 - 00:21:45:09

Dr Claas Kirchhelle

So that's a massive historical bias. And in that bias, our predecessors were subject to exactly the same racist biases, cultural biases, gender biases that that all of the rest of society was also subject to during the census. Those things are inscribed in the datasets that we're using. And robust critical historiography, both qualitative and quantitative, can really help us explore these biases and really also improve biomedical research going forward.

00:21:45:11 - 00:21:48:12

Dr Claas Kirchhelle

If I may, I don't know how much time we still have here. I mean.

00:21:48:12 - 00:21:53:00

Clare

I have all the time in the world. The other interesting.

00:21:53:02 - 00:22:25:02

Dr Claas Kirchhelle

The other thing involves the creation of surveillance systems for infectious diseases. Now, I've already talked earlier about how new genomic data is challenging old orientalist cliches of diseases always coming out of the east light from nonwhite people hitting white people. And this is not just due to the fact of of racist clashes, Orientals slashes through the science, also due to how our surveillance infrastructures have been created over time.

00:22:25:04 - 00:22:53:22

Dr Claas Kirchhelle

And in order to understand nowadays where the gaps of, for example, surveillance systems for pandemic preparedness are, we actually need to go back and understand how current Sentinel Station Sentinel monitoring sites are usually the result of convenient infrastructural choices. So these infrastructures of surveillance decided onto old colonial outposts. They're saddled on to places where resources historically have always been, and they aren't necessarily there with the diseases happen or occur.

00:22:53:22 - 00:23:26:20

Dr Claas Kirchhelle

Whether there's the greatest diversity of potential outbreak pathogens. Yeah, So again, working with the microbiologist, working with this kind of mass of data that microbiology has been producing since the 20th century, we can go back and we can see, historically speaking, there has always been a blind spot here. What we have said about microbiota in a certain area is based on on very limited data from one or two sentinel sites that perhaps the next Sentinel site we should choose should be one where historically we've always had a blind spot.

00:23:26:22 - 00:23:58:04

Dr Claas Kirchhelle

So those are the things that historians can find out and where we can, I believe, have a positive impact on microbiology moving forward and to just run that off with a concrete example of how that might happen is that I was very honored to serve for the UK COVID inquiry this year. And one of the questions they were very interested in was how the UK's infectious disease surveillance system had evolved prior to 2019.

00:23:58:06 - 00:24:15:22

Dr Claas Kirchhelle

And if we look at the UK, so that's take it away from the kind of questions of colonialism and empire. Just look at the UK. We see a historical preponderance for intensified surveillance and microbiological capacity in the south of England, away from population centers in the north.

00:24:15:24 - 00:24:17:00

Clare

Yeah.

00:24:17:02 - 00:24:41:22

Dr Claas Kirchhelle

I mean, I guess most people kind of guess this when you say it, but history can provide that hard data. This is actually hard data where where we can really find out where these biases were and really point to the fact that this was a big gap that had consequences in our ability to to have fine grained public health interventions.

00:24:41:24 - 00:25:17:10

Clare

That's so interesting. I think, you know, science isn't always empirical and data changes. And what you've made so clear is if the origin of that data is bias, then your results are biased, whether you did them in perfect lab conditions or not. So I think it's really exciting. Then obviously you're doing this, this lecture and if say, for example, I did an early career microbiologist listens to your your hot topic lecture, these kind of stories that you're talking about about institutional biases in data.

00:25:17:12 - 00:25:27:04

Clare

Is there a way that they could incorporate what you're talking about into their daily work? Is there a way that they can think about what they're doing slightly differently, do you think?

00:25:27:06 - 00:25:49:23

Dr Claas Kirchhelle

Yeah, absolutely. I mean, I think the nice thing about history is it's actually quite easy to do in the sense that what it requires you at the base of the cloud, which is to be critical about the context of the data that reaches you. I'm not making any claims about how well or how sloppy individual

microbiologist work. Historically speaking, there are lots of examples of both kinds of microbiologists.

00:25:50:00 - 00:26:17:16

Dr Claas Kirchhelle

But I think what what history teaches you is to be critical about that, the baseline assumptions that you have about your data. So if somebody says this is representative, a very easy question to ask you is actually how do we define representative here? Is this data that I'm getting not just sound in terms of how it's been produced within a single that, but also how that sample has actually been extracted from the field.

00:26:17:18 - 00:26:49:01

Dr Claas Kirchhelle

That's that's one of the first questions you can ask. But you could also ask about the power relations inscribed in that data. So one of the big discussions that I have when I go to low income countries or middle income countries and I speak to microbiologists working there, is the extreme frustration with the very long tradition of extractive microbiology that they've been exposed to, where they are there to collect samples, and those samples are then handed off to higher resource processing labs in different countries.

00:26:49:03 - 00:27:10:19

Dr Claas Kirchhelle

And yes, increasing their, you know, if they allowed in quotation marks to be offers on these papers, too. But they actually don't often have ownership either of the samples of the resulting data. So they are they are seen or they see themselves as being forced into the role of data providers, but not necessarily into the more prestigious roles of data analysis.

00:27:10:21 - 00:27:44:13

Dr Claas Kirchhelle

So when you're dealing with the sample that sample, it has to have been collected somewhere. It relies on the resources of the infrastructure that have allowed that sample to be collected and to be brought into a lab. And that then also depends on geopolitics. Again, I'm happy to give a concrete example. If you're looking at if you're looking for for lots of the plague samples and anthrax samples that we've got collected over time, many of these were collected because of biosecurity concerns and concerns and modeling about what biowarfare could look like.

00:27:44:13 - 00:28:20:22

Dr Claas Kirchhelle

So every sample that you've got, it's not again, it's nothing is ever really representative. But all of these samples have been collected at one point or another with a logic of either defensive or offensive bioweapons capabilities moving forward. So it's it's it's the ability to just think through all of the steps that make a sample reach you and also all of the steps that allow you to have the equipment to process that sample that makes you, I think, perhaps a more critical and more reflective microbiologist.

00:28:20:22 - 00:28:43:01

Dr Claas Kirchhelle

And again, I think, you know, I don't pretend to know how to do genomics. You know, that's that's not my job. Listen, fascinating with and again, every microbiologist I've spoken to has been extremely open and also self-reflective about this. But I think there's there's a hunger at the moment for these kind of interactions, both amongst historians and amongst microbiologists.

00:28:44:04 - 00:29:09:19

Clare

And you you mentioned about bacteriophages. And that in itself is a completely hot topic at the moment as the use of bacteriophage to potentially tackle this problem that is antimicrobial resistance. Are there any kind of specific ways that you think that you history of bacteriophage could inform, you know, this new research that's happening at the moment in the use of bacteriophage as a treatment?

00:29:09:21 - 00:29:34:24

Dr Claas Kirchhelle

Unsurprising. Yes, I think history history offers offers many insights. And we've actually got a special issue in phage coming out now. well on this that that's that's interdisciplinary. I think that there are multiple ways in which this can happen. I think on the one hand side, I think history is a great antidote against or confusing expectations about what phage therapy can and can't do.

00:29:35:01 - 00:30:13:08

Dr Claas Kirchhelle

I've spent the last 5 to 6 years looking at more depth into the market model of striving antibiotic innovation with a project with the Norwegian Research Council, and I think many of the insights also apply to Bacteriophage, where it's it's both a scientific challenge, but primarily it's also a challenge about valuing or at the valuation of different aspects of of innovation within a system that isn't necessarily always gets producing value in the public health sense and at the same time the history of FAS, because it's such an old technology, is also steeped in legends.

00:30:13:10 - 00:30:36:24

Dr Claas Kirchhelle

Sometimes they're nice legends, right? You know, lots of the stuff about Felixstowe reads like a, you know, glamorous movie of people moving to the Soviet Union and then, you know, other people falling victim to purges and things like that. But there is this this this persistent narrative that phage therapy somehow died out just because of antibiotics and how they came about in the West.

00:30:36:24 - 00:31:10:03

Dr Claas Kirchhelle

And what we're finding now and this is unpublished research that we're hoping to publish later this year with Institut Pasteur, is that it actually never went away in many high income countries, even after 1945, patients were being treated with bacteria phage. We've got the clinical records of this. And in the case of a country like France, up to 100 people per year were receiving bacteria phage either as cocktails or as tailored phage that have been kind of adapted to to to hit the specific infection profile that the clinician was dealing with.

00:31:10:05 - 00:31:38:14

Dr Claas Kirchhelle

So when it comes to the future of bacteriophage, phage therapy and the current hype, I think it's very important that we consider alternative to the antibiotic workhorses we're relying on so highly. But on the other hand, what we also look back at now, looking at close to 100 years of persistent data on different forms of phospholipid is that phage are not antibiotics and they would never be able to replace these antibiotic infrastructures that we've created.

00:31:38:19 - 00:32:01:16

Dr Claas Kirchhelle

They can complement them and they can act as targeted interventions. But this hope that I think is often the case or expressed and mediated worlds that are, you know, two minute reads, etc., that this is the forgotten cure. You know, the next big thing is is is an overrepresentation of what phage, empirically speaking, have over the last 100 years.

00:32:01:16 - 00:32:16:14

Dr Claas Kirchhelle

They are complements they are not a replacement of anti microbial. So it doesn't replace the fact that we actually need to invest a lot more on stewardship and microbial management. You know, there's no kind of wonder technology or magic bullet that's going to save us.

00:32:16:16 - 00:32:37:22

Clare

Yeah. So do you think then, you know, learning about this history could also that inform and help with public opinion about phages as well and having this historical use, could it potentially make the public feel a bit better about this phage research being introduced? Or could it then be like, Well, we've been using it for ages and it's not worked.

00:32:37:22 - 00:32:40:12

Clare

So like, what do you think that.

00:32:40:14 - 00:33:10:16

Dr Claas Kirchhelle

I think is? So it's always frustrating when it comes to that. So it's a bit of both. I think I, I liked, I guess like team realism. It's I think what we need is a realistic discourse about what phage can and can't do. I think we should be optimistic about the fact that there are actually plenty of different novel anti-microbial compounds and also phage remedies in the pipeline at various stages of the pipeline.

00:33:10:18 - 00:33:59:06

Dr Claas Kirchhelle

But I think this optimism that we get every two or three months when we've got another, you know, media wide report about the solution to MRSA, etc., is that it endlessly displaces the more important discussion about the fact that AMA is here with us to stay, and that regardless of whether we have a functional phage infrastructure, which I hope we have, or whether we have new antibiotic classes or antimicrobial classes, which is the markets, we will continue to be faced with this challenge of AMR that we should start perhaps reevaluating the infrastructures that we rely on in both food production and health systems to become more resilient without needing recourse to these forms of microbial

00:33:59:06 - 00:34:40:22

Dr Claas Kirchhelle

management. So to to to phrase that more simply, it's it's great to have technical fixes. Yeah, but they don't alleviate the underlying structural drivers of microbial stress that we are creating. And I think that is the most important thing to get across it because often and this is a really sorry, the insights from the 20th century is that the hope for the magic bullets endlessly displaces the actual hearts questions about the drivers, the inequities, the environmental stresses that are actually producing all of the problems we're facing into the medium to long term future, because we're endlessly hoping for the next quick fix and for fast.

00:34:40:22 - 00:34:59:12

Dr Claas Kirchhelle

That, for me is is one of the big challenges in the discourse around this, that we're both overenthusiastic and in so doing actually end up also harming their ability to actually change things in a way where overselling them.

00:34:59:14 - 00:35:36:01

Clare

Yeah, yeah, I can see that. That's so. Lever Well that's really interesting of not to espouse in that way and you mentioned about kind of informing the the inquiry with your research and obviously we like scientists limited in terms of what they can do with bacteriophage. Research is only really used as a last resort in the UK. Do you foresee maybe you'll kind of expertise or your colleagues or your area of research being used to potentially inform that kind of policy decision in the UK?

00:35:36:01 - 00:35:40:00

Clare

Is that something that happens? I don't know.

00:35:40:02 - 00:36:05:19

Dr Claas Kirchhelle

So historians I think are fairly regularly consulted for, for, for some of the of the broader policy debates. I mean obviously we'd always like to be consulted more, you know, all of these things. But I think at the end of the day, history should have a permanent place at these tables because in contrast to people modeling the future, we have an empirical past which we can draw on.

00:36:05:21 - 00:36:28:05

Dr Claas Kirchhelle

So with regards to antibiotic innovation, that's been also a very nice experience for me. It's been a very open area, I think because of this sense of of pervading crisis surrounding surrounding different innovation models, there's been a lot of interest in history, you know, different models that have worked, that haven't worked, so that there's been a lot of space actually, therefore in storage to inform policy discussion.

00:36:28:05 - 00:36:47:03

Dr Claas Kirchhelle

And with air marshal it's been it's been a great pleasure to see some some of the work my group has produced. You know, being cited by by the World Health Organization or by it by the World Bank when it comes to just warning about the structural drivers. Essentially what I just talked about.

00:36:47:03 - 00:36:47:10

Clare

Yeah.

00:36:47:10 - 00:37:15:10

Dr Claas Kirchhelle

Given this, because again, none of these problems are new. I think if AMR has been with us since the beginning of the antimicrobial era, much like the first reports from 1906. Yeah. Of of AMR Labs coming up. So it's not new. I don't think historians are small in any way other. It's just that the many generations of scientists have already bashed their heads against the wall when it comes to dealing with this.

00:37:15:10 - 00:37:38:00

Dr Claas Kirchhelle

And unfortunately, we've forgotten about some of the insights that the previous generations have really achieved about how to approach certain problems. So it's I guess it's playing this role as a Cassandra and saying, you know, this is a problem that won't go away like this. And here are five different evidence bases from from five different decades that could mobilize here that are useful.

00:37:38:02 - 00:38:06:24

Dr Claas Kirchhelle

And for the COVID inquiry, I think it's everybody likes to tell narratives about the past that are convenient. And I think that is particularly true in policy, where you always mobilize the past to

justify the future that you're setting. Yeah, and having a kind of firebreak in there or, you know, a kind of break that just slows down this mobilization of the past that is often very selective and just as well, it's probably more complex.

00:38:06:24 - 00:38:15:15

Dr Claas Kirchhelle

And actually there are some things that run against this narrative is a useful thing to have when it comes to making decisions about what kind of future we want to have.

00:38:15:21 - 00:38:31:18

Clare

Yeah, that critical analysis is so important. And I think, you know, you mentioning about Sage being years previously, my brain immediately went to, well, that's a good way of proving that it's okay to use it now. And that like appealed history I suppose, is just so dangerous.

00:38:31:20 - 00:39:12:09

Dr Claas Kirchhelle

I guess history is all we have, right? So we need to we need to we need to go into the past to make informed decisions about about where we want to go forward, because the past is all empirical, based on knowledge that we endlessly draw with, with, with the 5G aspect. Again, it has worked. I think we've now got enough clinical evidence from the present, but from from the past to show that not in specific instances phosphor is a great way of treating and even preventing certain forms of infectious disease and but we have to be extremely careful about the narratives that this is a forgotten cure.

00:39:12:15 - 00:39:22:04

Dr Claas Kirchhelle

Yeah, wasn't forgotten. It just didn't take off because there were other structural constraints on it that we have to consider when it comes to formulating viable solutions going forward.

00:39:23:24 - 00:39:52:16

Clare

Wow. There's lots to think about. Lots to think about. And I'm very much looking forward to hearing the other element of your research about the British Waterways. In the Hot Topic lecture. And I have one final question for you, and if you'd like, for the Microbiology Society members to take away one thing from you, your hot topic lecture, what would you like that to be?

00:39:52:18 - 00:39:54:20

Clare

It could be true, but.

00:39:54:22 - 00:40:26:08

Dr Claas Kirchhelle

I think I think the really simple thing is, is this, that wherever there is a microbiology laboratory, usually there's a historian sitting close by, you know, and another building down the road, and that it might be a good idea with regards to any topic that you're interested in or researching to just invite them out for coffee or have them invite you out for coffee and chat about how your version of the microbial past, if you're dealing with it, intersects with this and what you learn from them and what they can learn from you in turn.

00:40:26:10 - 00:40:39:10

Dr Claas Kirchhelle

And I think that for me is it is essentially where where all good interdisciplinary research starts is this moment of exchange. I'm just seeing the mutual overlaps.

00:40:39:12 - 00:40:43:23

Clare

Yeah, that's one. That's a good coffee. Could could save a lot of research I reckon.

00:40:43:23 - 00:40:45:18

Dr Claas Kirchhelle

Well I'll start to. Right.

00:40:45:20 - 00:41:10:11

Clare

Yeah. Yeah. That's so exciting and has been an absolute pleasure to speak to you. This is really interesting and it is kind of changed my perspective a little bit on a lot of areas of microbiology and I really hope that members have the same kind of reaction to listening to your your lecture annual conference and this is it your first time, but I'm assuming it would be your first time at a conference by.

00:41:10:13 - 00:41:27:19

Dr Claas Kirchhelle

It's my first time. I mean, the funny thing is, is that I've been digging into the archives of of the of the Microbiology Society for my research and culture collections. But so it's it's a huge honor to actually be at the conference I usually just read about 50 years ago. So it's you know, it's great to be there.

00:41:27:24 - 00:41:35:03

Clare

That's really interesting. I've definitely come and track you down a conference and pick your brain, But thank you so much. This is brilliant.

00:41:35:05 - 00:41:36:23

Dr Claas Kirchhelle

Yeah, Thank you very much for having me.

00:41:36:23 - 00:41:38:11

Clare

Take care. See, you at conference.

00:41:38:13 - 00:41:41:06

Dr Claas Kirchhelle

See you there.

00:41:41:08 - 00:42:08:06

Clare

It was absolute pleasure to speak to Class and discover a historian's perspective on microbiology. If you are at conference this year, Class will be giving his hot topic lecture at 8:45 on Thursday, the 11th of April. If you can't make it, don't worry his lecture will be available online after Annual Conference.