WEBVTT

NOTE duration:”00:06:30”

NOTE recognizability:0.855

NOTE language:en-us

NOTE Confidence: 0.879600226111111

00:00:00.000 --> 00:00:02.832 So I'm just going to give a pretty

NOTE Confidence: 0.879600226111111

00:00:02.832 --> 00:00:04.847 broad overview of some of the

NOTE Confidence: 0.879600226111111

00:00:04.847 --> 00:00:07.596 stuff that we study in in my group.

NOTE Confidence: 0.879600226111111

00:00:07.596 --> 00:00:10.999 Obviously we can't get into too much details,

NOTE Confidence: 0.879600226111111

00:00:11.000 --> 00:00:13.106 but I'd be happy to chat more about it

NOTE Confidence: 0.879600226111111

00:00:13.106 --> 00:00:15.358 with any of you that might be interested.

NOTE Confidence: 0.879600226111111

00:00:15.360 --> 00:00:17.608 The, the central aspect of it is how

NOTE Confidence: 0.879600226111111

00:00:17.608 --> 00:00:20.469 can we use pathogen genomics and and my

NOTE Confidence: 0.879600226111111

00:00:20.469 --> 00:00:22.880 group primarily works on viruses here.

NOTE Confidence: 0.879600226111111

00:00:22.880 --> 00:00:25.344 So how can we use virus genomics

NOTE Confidence: 0.879600226111111

00:00:25.344 --> 00:00:27.533 to answer questions about disease

NOTE Confidence: 0.879600226111111

00:00:27.533 --> 00:00:29.120 ecology and epidemiology?

NOTE Confidence: 0.879600226111111

00:00:29.120 --> 00:00:31.586 And to take this a step further is how

NOTE Confidence: 0.879600226111111

00:00:31.586 --> 00:00:34.164 can we use virus genomics to actually

NOTE Confidence: 0.879600226111111

00:00:34.164 --> 00:00:36.930 to implement that within public health

NOTE Confidence: 0.879600226111111

00:00:37.007 --> 00:00:40.066 systems to help provide more detailed

NOTE Confidence: 0.879600226111111

00:00:40.066 --> 00:00:42.918 information for surveillance programs.

NOTE Confidence: 0.879600226111111

00:00:42.920 --> 00:00:44.880 So what do I mean by this?

NOTE Confidence: 0.879600226111111

00:00:44.880 --> 00:00:46.940 There's several different ways

NOTE Confidence: 0.879600226111111

00:00:46.940 --> 00:00:50.030 in which genomics can be helpful

NOTE Confidence: 0.879600226111111

00:00:50.115 --> 00:00:52.658 for outbreak investigations for

NOTE Confidence: 0.879600226111111

00:00:52.658 --> 00:00:54.956 understanding disease ecology.

NOTE Confidence: 0.879600226111111

00:00:54.960 --> 00:00:56.872 One of the and I'm going to use

NOTE Confidence: 0.879600226111111

00:00:56.872 --> 00:00:58.819 SARS COV two as some examples here

NOTE Confidence: 0.879600226111111

00:00:58.819 --> 00:01:01.183 because I feel like a lot of people

NOTE Confidence: 0.879600226111111

00:01:01.183 --> 00:01:02.678 can relate to this aspect.

NOTE Confidence: 0.879600226111111

00:01:02.680 --> 00:01:04.420 But to start with see if

NOTE Confidence: 0.879600226111111

00:01:04.420 --> 00:01:05.482 this works detection.

NOTE Confidence: 0.879600226111111

00:01:05.482 --> 00:01:07.892 There's this process called metagenomic

NOTE Confidence: 0.879600226111111

00:01:07.892 --> 00:01:10.883 sequencing where you can take a clinical

NOTE Confidence: 0.879600226111111

00:01:10.883 --> 00:01:12.800 sample that has that you don't know

NOTE Confidence: 0.879600226111111

00:01:12.800 --> 00:01:14.360 what the pathogen that is causing it.

NOTE Confidence: 0.879600226111111

00:01:14.360 --> 00:01:15.992 You can sequence all the nucleic

NOTE Confidence: 0.879600226111111

00:01:15.992 --> 00:01:18.280 acid that is in there and you can

NOTE Confidence: 0.879600226111111

00:01:18.280 --> 00:01:19.700 do some bioinformatics to try

NOTE Confidence: 0.879600226111111

00:01:19.700 --> 00:01:21.581 to figure out like what pathogen

NOTE Confidence: 0.879600226111111

00:01:21.581 --> 00:01:23.448 might be causing this infection.

NOTE Confidence: 0.879600226111111

00:01:23.448 --> 00:01:24.906 And indeed, when the,

NOTE Confidence: 0.879600226111111

00:01:24.906 --> 00:01:25.532 you know,

NOTE Confidence: 0.879600226111111

00:01:25.532 --> 00:01:27.097 first cases of pneumonia for

NOTE Confidence: 0.879600226111111

00:01:27.097 --> 00:01:28.399 Wuhan were coming out,

NOTE Confidence: 0.879600226111111

00:01:28.400 --> 00:01:30.320 it was many genomic sequencing that

NOTE Confidence: 0.879600226111111

00:01:30.320 --> 00:01:32.718 identified that this was a novel coronavirus.

NOTE Confidence: 0.879600226111111

00:01:32.720 --> 00:01:35.280 And this is becoming more and more popular

NOTE Confidence: 0.879600226111111

00:01:35.280 --> 00:01:38.104 to screen undiagnosed fever illnesses,

NOTE Confidence: 0.879600226111111

00:01:38.104 --> 00:01:38.832 meningitis,

NOTE Confidence: 0.879600226111111

00:01:38.832 --> 00:01:39.560 encephalitis,

NOTE Confidence: 0.879600226111111

00:01:39.560 --> 00:01:41.264 these sorts of things that have

NOTE Confidence: 0.879600226111111

00:01:41.264 --> 00:01:43.385 a better idea of what pathogens

NOTE Confidence: 0.879600226111111

00:01:43.385 --> 00:01:45.237 are circulating caustic disease.

NOTE Confidence: 0.879600226111111

00:01:45.240 --> 00:01:47.370 Once we've kind of identified

NOTE Confidence: 0.879600226111111

00:01:47.370 --> 00:01:49.074 an outbreak that's happening,

NOTE Confidence: 0.879600226111111

00:01:49.080 --> 00:01:51.236 we can sequence some of the first

NOTE Confidence: 0.879600226111111

00:01:51.236 --> 00:01:53.549 cases here and what I like to call

NOTE Confidence: 0.879600226111111

00:01:53.549 --> 00:01:55.913 the snapshot to get a basic idea of of

NOTE Confidence: 0.879600226111111

00:01:55.913 --> 00:01:59.040 of what is happening in this scenario.

NOTE Confidence: 0.879600226111111

00:01:59.040 --> 00:02:01.296 So here's just a sort of a cartoon

NOTE Confidence: 0.879600226111111

00:02:01.296 --> 00:02:02.998 representation of a phylogenetic tree.

NOTE Confidence: 0.879600226111111

00:02:03.000 --> 00:02:04.211 But if you sequence some of these

NOTE Confidence: 0.879600226111111

00:02:04.211 --> 00:02:05.916 first cases, you can get an idea like,

NOTE Confidence: 0.879600226111111

00:02:05.920 --> 00:02:07.048 is this a zoonosis?

NOTE Confidence: 0.879600226111111

00:02:07.048 --> 00:02:08.740 Is this something that was not

NOTE Confidence: 0.879600226111111

00:02:08.801 --> 00:02:10.776 circulating in the human population

NOTE Confidence: 0.879600226111111

00:02:10.776 --> 00:02:12.356 that recently spilled over?

NOTE Confidence: 0.879600226111111

00:02:12.360 --> 00:02:14.280 Was this something that happened

NOTE Confidence: 0.879600226111111

00:02:14.280 --> 00:02:16.920 multiple times or one time based on

NOTE Confidence: 0.879600226111111

00:02:16.920 --> 00:02:19.440 the other viruses that it's related to,

NOTE Confidence: 0.879600226111111

00:02:19.440 --> 00:02:21.995 we can get an idea of transmission,

NOTE Confidence: 0.879600226111111

00:02:22.000 --> 00:02:24.640 develop diagnostics, these sorts of things,

NOTE Confidence: 0.879600226111111

00:02:24.640 --> 00:02:26.670 some really basic information that

NOTE Confidence: 0.879600226111111

00:02:26.670 --> 00:02:29.347 could be helpful for an immediate

NOTE Confidence: 0.879600226111111

00:02:29.347 --> 00:02:31.078 public health response.

NOTE Confidence: 0.879600226111111

00:02:31.080 --> 00:02:33.438 And taking this another step further,

NOTE Confidence: 0.879600226111111

00:02:33.440 --> 00:02:35.771 you can also do very dense sequencing

NOTE Confidence: 0.879600226111111

00:02:35.771 --> 00:02:37.817 of outbreaks this year showing from

NOTE Confidence: 0.879600226111111

00:02:37.817 --> 00:02:40.106 like a long term care facility where

NOTE Confidence: 0.879600226111111

00:02:40.172 --> 00:02:42.540 if you sequence a lot of the different

NOTE Confidence: 0.879600226111111

00:02:42.540 --> 00:02:44.188 cases that were occurring there,

NOTE Confidence: 0.879600226111111

00:02:44.188 --> 00:02:46.260 you can get information about how

NOTE Confidence: 0.879600226111111

00:02:46.260 --> 00:02:48.160 are the residents getting infected,

NOTE Confidence: 0.879600226111111

00:02:48.160 --> 00:02:50.060 Are they getting infected from

NOTE Confidence: 0.879600226111111

00:02:50.060 --> 00:02:51.930 the skilled nurses or other sort

NOTE Confidence: 0.879600226111111

00:02:51.930 --> 00:02:53.420 of employees they're bringing it

NOTE Confidence: 0.879600226111111

00:02:53.471 --> 00:02:54.398 from the community?

NOTE Confidence: 0.879600226111111

00:02:54.400 --> 00:02:56.364 Is there transmission actually

NOTE Confidence: 0.879600226111111

00:02:56.364 --> 00:02:57.837 within these facilities?

NOTE Confidence: 0.816165297826087

00:02:57.840 --> 00:02:59.653 We actually did this for Star School

NOTE Confidence: 0.816165297826087

00:02:59.653 --> 00:03:01.459 Week 2 with the National Basketball

NOTE Confidence: 0.816165297826087

00:03:01.459 --> 00:03:03.403 Association and the NFL to help

NOTE Confidence: 0.816165297826087

00:03:03.403 --> 00:03:05.079 them monitor their protocols.

NOTE Confidence: 0.816165297826087

00:03:05.080 --> 00:03:06.760 So when they have outbreaks and teams,

NOTE Confidence: 0.816165297826087

00:03:06.760 --> 00:03:08.662 are these caused by team meetings

NOTE Confidence: 0.816165297826087

00:03:08.662 --> 00:03:11.313 or is this caused by you know the

NOTE Confidence: 0.816165297826087

00:03:11.313 --> 00:03:13.287 players and coaches and staff getting

NOTE Confidence: 0.816165297826087

00:03:13.358 --> 00:03:14.926 infected in their communities

NOTE Confidence: 0.816165297826087

00:03:14.926 --> 00:03:17.278 and and everybody bringing it in.

NOTE Confidence: 0.816165297826087

00:03:17.280 --> 00:03:19.752 Then on a bigger level you can use

NOTE Confidence: 0.816165297826087

00:03:19.752 --> 00:03:21.420 sequencing and and phylogenetics

NOTE Confidence: 0.816165297826087

00:03:21.420 --> 00:03:23.477 to understand patterns of spread.

NOTE Confidence: 0.816165297826087

00:03:23.477 --> 00:03:25.990 So on the bacterial side of things

NOTE Confidence: 0.816165297826087

00:03:26.060 --> 00:03:28.016 you can look for the emergence

NOTE Confidence: 0.816165297826087

00:03:28.016 --> 00:03:30.120 and spread of drug resistance.

NOTE Confidence: 0.816165297826087

00:03:30.120 --> 00:03:31.716 For viruses like SARS, COV two,

NOTE Confidence: 0.816165297826087

00:03:31.720 --> 00:03:33.816 we can look to see patterns of human

NOTE Confidence: 0.816165297826087

00:03:33.816 --> 00:03:35.360 movement and how they relate to

NOTE Confidence: 0.816165297826087

00:03:35.360 --> 00:03:38.840 viruses that are are are spreading.

NOTE Confidence: 0.816165297826087

00:03:38.840 --> 00:03:40.905 And so there is some fundamental aspects

NOTE Confidence: 0.816165297826087

00:03:40.905 --> 00:03:43.029 of this of of virus evolution that

NOTE Confidence: 0.816165297826087

00:03:43.029 --> 00:03:45.319 allows us to do these types of work.

NOTE Confidence: 0.816165297826087

00:03:45.320 --> 00:03:47.238 So we start here at the bottom,

NOTE Confidence: 0.816165297826087

00:03:47.240 --> 00:03:49.144 this is where we want to get to

NOTE Confidence: 0.816165297826087

00:03:49.144 --> 00:03:50.877 where these dots here are sequence

NOTE Confidence: 0.816165297826087

00:03:50.877 --> 00:03:52.671 samples and each of these nodes

NOTE Confidence: 0.816165297826087

00:03:52.733 --> 00:03:54.593 that connect them are an inferred

NOTE Confidence: 0.816165297826087

00:03:54.593 --> 00:03:56.490 ancestor at some point in time.

NOTE Confidence: 0.816165297826087

00:03:56.490 --> 00:03:58.765 And for you know epidemiology we we

NOTE Confidence: 0.816165297826087

00:03:58.765 --> 00:04:01.475 want to have that time aspect of things.

NOTE Confidence: 0.816165297826087

00:04:01.480 --> 00:04:03.872 So not only can we estimate like where

NOTE Confidence: 0.816165297826087

00:04:03.872 --> 00:04:05.678 this ancestor might have occurred,

NOTE Confidence: 0.816165297826087

00:04:05.680 --> 00:04:08.200 we want to know when did that occur.

NOTE Confidence: 0.816165297826087

00:04:08.200 --> 00:04:10.110 And to do that we have to know a little

NOTE Confidence: 0.816165297826087

00:04:10.160 --> 00:04:12.120 bit about the evolution of the pathogen.

NOTE Confidence: 0.816165297826087

00:04:12.120 --> 00:04:14.248 So here you have a virus that

NOTE Confidence: 0.816165297826087

00:04:14.248 --> 00:04:16.869 starts with some sort of error prone

NOTE Confidence: 0.816165297826087

00:04:16.869 --> 00:04:19.120 replication within a host and as

NOTE Confidence: 0.816165297826087

00:04:19.120 --> 00:04:20.592 it transmits between host,

NOTE Confidence: 0.816165297826087

00:04:20.600 --> 00:04:21.972 there's these bottlenecks that

NOTE Confidence: 0.816165297826087

00:04:21.972 --> 00:04:24.030 randomly select for some of the

NOTE Confidence: 0.816165297826087

00:04:24.092 --> 00:04:26.118 viruses that go on to the next person.

NOTE Confidence: 0.816165297826087

00:04:26.120 --> 00:04:28.360 And when you track these over time,

NOTE Confidence: 0.816165297826087

00:04:28.360 --> 00:04:30.184 there's almost like this clock like

NOTE Confidence: 0.816165297826087

00:04:30.184 --> 00:04:31.754 evolution where there's a semi

NOTE Confidence: 0.816165297826087

00:04:31.754 --> 00:04:33.524 predictable amount of change that

NOTE Confidence: 0.816165297826087

00:04:33.524 --> 00:04:35.524 is happening over time and which

NOTE Confidence: 0.816165297826087

00:04:35.524 --> 00:04:37.612 you can use to then help scale your

NOTE Confidence: 0.816165297826087

00:04:37.674 --> 00:04:38.720 phylogenetic tree.

NOTE Confidence: 0.816165297826087

00:04:38.720 --> 00:04:41.065 So in this situation where you have

NOTE Confidence: 0.816165297826087

00:04:41.065 --> 00:04:42.880 an outbreak at location D,

NOTE Confidence: 0.816165297826087

00:04:42.880 --> 00:04:44.524 you can estimate when that outbreak

NOTE Confidence: 0.816165297826087

00:04:44.524 --> 00:04:46.385 happened as well as determined that

NOTE Confidence: 0.816165297826087

00:04:46.385 --> 00:04:48.515 this was caused by multiple interactions.

NOTE Confidence: 0.810088677777778

00:04:50.720 --> 00:04:53.560 Here are some of the systems we primarily

NOTE Confidence: 0.810088677777778

00:04:53.560 --> 00:04:56.400 study tick and mosquito borne viruses.

NOTE Confidence: 0.810088677777778

00:04:56.400 --> 00:04:58.633 We like to study them across different

NOTE Confidence: 0.810088677777778

00:04:58.633 --> 00:05:00.960 sort of complexities in their ecology here

NOTE Confidence: 0.810088677777778

00:05:00.960 --> 00:05:04.368 with with a tick borne virus blossom that

NOTE Confidence: 0.810088677777778

00:05:04.368 --> 00:05:07.320 is the host is small mammals and then we

NOTE Confidence: 0.810088677777778

00:05:07.393 --> 00:05:10.405 have mosquito borne viruses like Eastern

NOTE Confidence: 0.810088677777778

00:05:10.405 --> 00:05:13.254 equine encephalitis virus in West Nile

NOTE Confidence: 0.810088677777778

00:05:13.254 --> 00:05:15.914 that are where their hosts are birds.

NOTE Confidence: 0.810088677777778

00:05:15.920 --> 00:05:17.564 In both these cases humans would

NOTE Confidence: 0.810088677777778

00:05:17.564 --> 00:05:19.920 be dead end hosts so they're not

NOTE Confidence: 0.810088677777778

00:05:19.920 --> 00:05:21.520 contributing to onward transmission.

NOTE Confidence: 0.810088677777778

00:05:21.520 --> 00:05:23.032 And then you have things like Dengue virus

NOTE Confidence: 0.810088677777778

00:05:23.032 --> 00:05:24.677 and Zika virus where the hosts are humans.

NOTE Confidence: 0.810088677777778

00:05:24.680 --> 00:05:26.872 And if you think about just some basic

NOTE Confidence: 0.810088677777778

00:05:26.872 --> 00:05:28.358 differences in the ecology here,

NOTE Confidence: 0.810088677777778

00:05:28.360 --> 00:05:31.256 right here, we have very low potential for

NOTE Confidence: 0.810088677777778

00:05:31.256 --> 00:05:34.560 it to move between locations very fast.

NOTE Confidence: 0.810088677777778

00:05:34.560 --> 00:05:36.448 Right Now you add some wings to the

NOTE Confidence: 0.810088677777778

00:05:36.448 --> 00:05:38.519 system and they can spread a lot further.

NOTE Confidence: 0.810088677777778

00:05:38.520 --> 00:05:39.438 And here we have, you know,

NOTE Confidence: 0.810088677777778

00:05:39.440 --> 00:05:40.910 humans and you have planes and things

NOTE Confidence: 0.810088677777778

00:05:40.910 --> 00:05:42.560 can get around the world quite quickly.

NOTE Confidence: 0.919245251538461

00:05:45.000 --> 00:05:46.652 So here's just a plug if you

NOTE Confidence: 0.919245251538461

00:05:46.652 --> 00:05:48.079 are interested in some of this.

NOTE Confidence: 0.919245251538461

00:05:48.080 --> 00:05:50.593 I do teach a class on genomic

NOTE Confidence: 0.919245251538461

00:05:50.593 --> 00:05:52.972 epidemiology with a very much a focus

NOTE Confidence: 0.919245251538461

00:05:52.972 --> 00:05:55.920 on how to apply this for public health.

NOTE Confidence: 0.919245251538461

00:05:55.920 --> 00:05:57.630 There's there's not necessarily any

NOTE Confidence: 0.919245251538461

00:05:57.630 --> 00:05:59.768 prereqs needed for it other than

NOTE Confidence: 0.919245251538461

00:05:59.768 --> 00:06:01.613 a basic understanding of molecular

NOTE Confidence: 0.919245251538461

00:06:01.613 --> 00:06:03.487 biology and and microbiology that

NOTE Confidence: 0.919245251538461

00:06:03.487 --> 00:06:05.172 hopefully you're getting from within

NOTE Confidence: 0.919245251538461

00:06:05.172 --> 00:06:07.128 this program or from previous education.

NOTE Confidence: 0.919245251538461

00:06:07.128 --> 00:06:09.560 But I do want to know if you

NOTE Confidence: 0.919245251538461

00:06:09.623 --> 00:06:11.079 are interested in this.

NOTE Confidence: 0.919245251538461

00:06:11.080 --> 00:06:13.152 I'm probably not going to offer it

NOTE Confidence: 0.919245251538461

00:06:13.152 --> 00:06:15.840 in spring of 2025 as long as my

NOTE Confidence: 0.919245251538461

00:06:15.840 --> 00:06:18.036 sabbatical approval or gets approved.

NOTE Confidence: 0.919245251538461

00:06:18.036 --> 00:06:21.480 So I would suggest taking it this

NOTE Confidence: 0.919245251538461

00:06:21.581 --> 00:06:23.670 spring and here is my information

NOTE Confidence: 0.919245251538461

00:06:23.670 --> 00:06:26.119 if you want to get a hold of me.

NOTE Confidence: 0.919245251538461

00:06:26.120 --> 00:06:26.360 Thank you.