Good afternoon, everyone. Thanks for turning out on such a beautiful early spring day. We know this reflects your heart-felt devotion to scientific inquiry. And also that some of you were required to be here, but that's just a small thing. My name is Pat Thomas, and I teach health and medical journalism to Graduate Students at the Grady College of Journalism and Mass Communication. And this is the fourth year in a row that I've been fortunate enough to be able to co-organization and co-sponsor Voices From the Vanguard series in collaboration with Dan Colley and the Center For Emerging Global and Tropical Diseases. You know, we have really felt that the purpose of this series was to bring the world to you, I mean, here we are in Athens, Georgia, and we have been able to bring speakers from California, New York Washington, Boston, even Geneva, Switzerland. But you know, there's a lot of the world that exists in Athens, Georgia as well. And although we've never before features
UGA professor, which was a first.

And as you can imagine since Dan Colley is the co-organizer of this series it was really hard to get him to agree to also be a featured speaker, but I'm really glad that he did.

And I'm going to now -- just one more note I'd like to mention.

After Dan's no doubt fabulous talk we'll be moving next door to Dellstanian Hall (Phonetic) where as one of my students says we have the best food of any reception that you find on campus.

So come over, talk to the speaker, hang out with us for a little while.

That's immediately following the talk.

So now I'm just going to welcome another of my favorite people,

vice president for research David Lee, who's going to introduce our speaker.

Actually had to race back here from Atlanta, had to give a talk at the board of regents meeting today.

But it was important to me to be here.

Not just to introduce today's speaker, Dan Colley, although I will do that,
but also because I really wanted to have
the chance to behalf of the university

to thank both Dan and Pat for organizing
what I think has been a wonderful series

over multiple years now.

It's important, this series, not only because
it exposes students to some of what --

some of the cutting-edge work that's
going on in the area of global diseases,

infectious diseases, but I think
more importantly than that,

it really has been a great -- each of
those stories has been a great lesson

in what a single individual can do to change
the lives of a lot of people around the world,

given the vision, given the energy and so on.

And really much as anything, that's
what I've gotten out of these lectures.

And whether that's helping develop or taking
the lead in developing new malaria vaccine

as we heard about most recently, or
whether it was starting a foundation

that is making a difference in terms of
getting people to focus on neglected diseases.

I think there have been some really
wonderful stories here and I hope --

I hope students have been able to enjoy that.

I can't think of a more important thing for
a university to do that to provide students
with those kinds of life examples.

Okay, so now I'm going to introduce today's speaker, Dan Colley.

Dan is one of these guys who's managed to make a living spending time in some of the greatest places on Earth, and I really hate him for that.

But maybe that's a consequence of having grown up in Buffalo, New York.

Just felt the urge to get away.

And in fact, as soon as dad hit 17 he headed south.

First stop was -- actually, where was the first stop?

( Laughter )

>> Oh, Center College, how could I forget.

You have that in common with our president.

Got your -- Dan got his bachelor's degree at Center College, Kentucky.

And then headed further south to Tulane, where he obtained a Ph.D.

And I think there Dan really trained as a fundamental immunologist.

He then made a mistake.

He headed back north, went to Yale for a post-doc.
the bitter cold of New Haven.

[00:04:50.986] Decided to make a terrible mistake,

[00:04:53.836] and this time he headed south
and he didn't know when to stop.

[00:04:57.146] So he ended up in Brazil.

[00:04:59.316] And there he spent the better part of a
year, and Dan I might get this story wrong

[00:05:04.316] because I haven't had a chance
to check it with you.

[00:05:06.116] But I think you ended up working with some
of the Brazilian federal research entities

[00:05:12.596] out in the field, so to speak,
working on tropical diseases.

[00:05:18.216] And it's there where Dan's life-long
love of schistosomiasis really developed.

[00:05:26.386] And as Pat Thomas would point out, it
was really a fundamental reinventing

[00:05:31.146] of Dan Colley at this point.

[00:05:33.616] From fundamental immunologist to
immunologist who was really concerned with how

[00:05:38.256] to attack a tragic disease that takes a
huge toll on a very large number of people.

[00:05:44.516] So Dan Colley Version 2, as Pat would
describe, then came back to the states and ended

[00:05:53.306] up at Vanderbilt as an assistant professor.

[00:05:56.676] Established his research program,
got NIH funding, did all the things

[00:06:03.106] that a good professor should do,
working hard to attack this disease.

[00:06:09.406]
Somewhere along the way, and I'm not --
maybe we'll clarify this this afternoon,

[00:06:14.536]
Dan decided to go to the Center
For Disease Control and Prevention,

[00:06:18.676]
and he spent nine years there directing
their parasitic diseases group.

[00:06:25.276]
At that point he decided that he wanted to
come back to the university to academia.

[00:06:30.926]
Fortunately, the University of Georgia had
a position, and it was to direct the Center

[00:06:36.736]
For Tropical and Emerging Global Diseases that
Rick Carlton had started a number of years ago.

[00:06:43.896]
So it's a great story.

[00:06:45.096]
We're going to hear a lot more about
it tonight, and I'm looking forward

[00:06:50.326]
to hearing Dan's first-hand stories of how
he got so interested in schistosomiasis.

[00:06:54.586]
Dan, it's a pleasure to produce you.

[00:06:58.516]
( Applause )

[00:07:04.966]
>> I'm supposed to put this on?

[00:07:09.166]
Let me get set up here.

[00:07:14.186]
Thank you very much, David.

[00:07:15.586]
Most of that was true.

[00:07:19.396]
My mother might not recognize some of it, but --

[00:07:25.736]
I'd like to start by thanking
the organizers for inviting me.

[00:07:29.396] ( Laughter )

[00:07:31.976] >> Now this is -- this is a real honor to be able to speak at home.

[00:07:37.396] I have no jet lack from doing this.

[00:07:40.356] This is really great.

[00:07:42.796] So I would like to first start by doing a little advertisement about the Center For Tropical

[00:07:50.116] and Emerging Global Diseases, which some of you know about, many of you know about.

[00:07:56.916] But some of you don't.

[00:07:57.996] And this is the kind of thing that I do at the start of seminars when I go someplace.

[00:08:03.546] What we have here at UGA is a center, an interdisciplinary center

[00:08:08.576] that has 19 faculty members, or will when Don Harden gets here in March.

[00:08:15.266] And the mission is very clear.

[00:08:18.506] It's to pursue cutting-edge research on tropical and emerging global diseases

[00:08:23.106] and train students in this field.

[00:08:25.186] And we have a number of goals.

[00:08:27.956] We want to become and remain a preeminent center for research and education in parasitic diseases

[00:08:35.256] and other global diseases, and turn research into medical and public health interventions.

[00:08:42.116]
And to promote global research and education here at UGA and in Georgia.

[00:08:48.196] Now some of those goals are more difficult to attain than others.

[00:08:52.146] The middle one is really hard.

[00:08:55.246] Turning research into medical and public health interventions is a challenge.

[00:08:59.496] It's a long-term goal.

[00:09:01.586] But what we do in the center will take us that way

[00:09:04.906] if that's the perspective that we want to put on it.

[00:09:08.966] We also have a training mission.

[00:09:11.336] We have five training grants.

[00:09:13.286] One is a standard NIH T 32 training grant, and three of them are NIH training grants,

[00:09:21.796] but they're D 43s from the Fogarty International Center to train people in other places,

[00:09:28.596] bring them to UGA, train them where they are, let them get their degrees

[00:09:33.056] and things in their home countries.

[00:09:35.486] And we have one in Argentina, one in Brazil, an one in Kenya.

[00:09:39.546] And then we have an Ellison Medical Foundation training grant that is travelling.

[00:09:45.406] It is to send our students overseas and to bring students from overseas labs to ours.

[00:09:51.496] And we have six different principle
investigators out of the 19
[00:09:55.676]
that have overseas research, in place research.
[00:10:00.406]
Everyone else has their work here.
[00:10:03.246]
But these six have work here and elsewhere.
[00:10:06.806]
And this is just a list of the people.
[00:10:10.116]
And I'm not going to belabor
this, but I think it's important
[00:10:12.816]
to say it really is interdisciplinary.
[00:10:16.356]
We have people in the center from eight
different departments, which are listed here,
[00:10:21.746]
and four different colleges and schools.
[00:10:25.046]
And we come at these diseases
from many different perspectives.
[00:10:30.136]
And I think that's the strength of the center.
[00:10:33.036]
We don't all collaborate one with another,
[00:10:35.626]
we collaborate when it's
convenient and when there's a need.
[00:10:39.236]
But we do know there's somebody down the
hall or across campus that we can draw
[00:10:43.936]
on to get a different perspective
on our own research.
[00:10:47.066]
And I think that's really important.
[00:10:49.356]
So these are the diseases that are studied.
[00:10:53.456]
We have malaria, African
trypanosomiasis, or sleeping sickness.
Toxoplasmosis, cryptosporidiosis, cyclosporiasis, shagus disease (Phonetic),
leishmaniasis, Cysticercosis, schistosomiasis, lymphatic filariasis, if -- and vector biology.

Now it's a big list of long names. But these are all problems somewhere. And many of them are actually still problems in the U.S..
Some of them are on the bio defense priority pathogens list, some of them are major global health problems, some of them are focal problems. But I'm here to tell you, you don't want any of them.
These are not things that you want. So these are the kinds of things that we study.
Now, enough of the ad, we're going on to schistosomiasis. Now, schistosomiasis, as you could tell by the title, is a worm infection that 200 million people have. That's a lot of people. Now most of them are in Sub-Saharan Africa. Some of them, about a million, are in Asia, maybe 2 million. And under a million probably
in South America by now.

[00:12:11.966] So this is largely a Sub-Saharan African problem, but not only.


[00:12:20.046] So we've heard some lectures and we'll hear some more

[00:12:23.496] about soil transmitted helminths (Phonetic) that live in the gut.

[00:12:27.076] That's outside the body.

[00:12:29.026] Come on, that's not a real worm.

[00:12:30.986] These live inside your body, in your blood vessels.

[00:12:35.556] And they live there for a very long time.

[00:12:38.046] And there's a male and a female, and they mate, and they make eggs,

[00:12:41.266] and therein lies most of the problem we mentioned.

[00:12:45.146] The global distribution depends on snails.

[00:12:49.596] Certain snails.

[00:12:51.676] Don't have the snails, you don't have transmission.

[00:12:54.476] But even to a great extent depends on sanitation or the lack therefore thereof.

[00:12:59.966] And that's a real problem.

[00:13:01.596] Some day we won't have this problem if we have sanitation.
It's a chronic infection, so these worms can live in your blood vessels for up to 40 years.

[00:13:10.816] You know, 40 years.

[00:13:13.766] The mean life span is probably more like 7 to 10,

[00:13:17.596] but they can live for 40 years in your blood vessels.

[00:13:21.196] [00:13:22.286] Untreated, 5, maybe 10% of the people who have it go on to very severe disease and die.

[00:13:30.866] And they die of messing up your liver, mainly.

[00:13:34.316] And the blood flow back through the liver doesn't work,

[00:13:37.166] and you end up with esophageal varices, and you bleed out.

[00:13:42.246] The other 90 to 95% have what's called subtle morbidity, and we'll mention that in a minute.

[00:13:49.216] So there's a good drug more schistosomiasis, it's called Praziquantal.

[00:13:54.046] It's available, it's not free, like some of the drugs, to treat neglected tropical diseases,

[00:14:00.466] but some groups are working on that.

[00:14:02.676] And Praziquantal is a good drug.

[00:14:04.506] It cures you.

[00:14:05.856] The problem in the real world is people get it again, an again, an again.

[00:14:11.586] There's no vaccine.

[00:14:13.346] So we're stuck only with a drug.
So this is the life cycle, and it's also the evidence for why I'm a scientist and not an artist.

But if you look at this, it's -- this life cycle -- I can't -- let's see here. See if I can get the pointer to work.

No, okay. The adult worms, the pink and blue ones up there, the males and the females, live in the blood vessels. And they make eggs. And there are three main species that infect people, and those eggs are meant to portray those.

The eggs have to get out of the body or there's no life cycle. So the eggs get out of the body in feces or urine, depending on the strain, the species of schistosomes. When they hit the water, they have to get to fresh water, inside, the little embryo hatches out of the egg and swims around looking for a snail. Not any old snail, has to be -- not that snail, a specific kind of snail. Each one has a different set of snails.
Then we reproduce in there asexually.

So out of one of these mericia (Phonetic) going into a snail you might get 10,000 of the next stage.

This is the mutilative stage.

So 10,000 of these little wiggly guys come out over here on the left, and they're looking for us.

They want to penetrate through our skin, we don't know it, they have a bunch of enzymes that help them get through the skin.

They come in and they migrate around, and over about five or six weeks they mature to adult worms, and you have the whole thing over again.

So that's the life cycle.

And this is what it looks like in pictures.

So you have adult worms up there at the top.

They're making eggs over on the right-hand side.

What's down below I'll show you in a minute.

But the eggs get out.

They hatch.

The miracidium go out looking for a snail.
Turns into 10,000 of the infectious stage, and around you go again.

[00:16:21.596]  [00:16:22.996] So this is what the adult male and female worms look like.

[00:16:27.106] They're not very big.

[00:16:28.486] They can't be very big, they're in your blood vessels.

[00:16:31.586] So they're maybe about a half an inch long and like a piece of thread.

[00:16:36.976] And there's male -- let's go back here --

[00:16:40.206] there's the male -- this is technically a flat worm.

[00:16:44.056] So this flat worm curves up, the male curves up and forms a groove, and the female fits in that groove, and they sit there in your blood vessels and mate and eat for life.

[00:16:55.886] 40 years. Tough life, right?

[00:16:58.156] You know, stupid worm.

[00:16:59.726] Anyway, so the male and the female form this sort of mating pair.

[00:17:07.006] And these are just different pictures that either I've taken or stolen from people,

[00:17:12.166] and they show the worm out and they show the worm in the body.

[00:17:16.126] And they show it down here in the left-hand corner is a blood vessel.

[00:17:20.446] So you can have a lot of these worms.
Most people don't.

Up in the left-hand corner is a picture of 1659 worms that came out of a Brazilian 18-year-old boy.

Because I counted them.

So I know.

And a medical student counted them back in 1970.

So that's a lot of worms.

Most people don't have that many worms, but we don't really know how many most people have.

So this is the situation in terms of morbidity and mortality.

Morbidity is when you get sick and mortality is when you die.

200 million people infected in the world.

About 20 million of them, remember I said 5 to 10%, so we'll say 10%, have what's considered severe disease.

About 100 million have moderate morbidity, or what's these days being called subtle morbidity.

Now I maintain that moderate morbidity is something that someone else has.

Not you. We don't know how bad this is, but we do know it's not good.

And it impedes learning capabilities, it impedes growth, it has --
you lose a lot of blood in your urine, things like that.

And then maybe -- maybe as many as 80 million really don't have any consequences.

But we don't know how severe those might be.

If, you know, maybe there's a gradation there.

So this is what the culprit is.

So how do you get sick from schistosomiasis?

You get sick because some of those eggs that the worm pair makes don't get out of the body.

They get swept by the blood to your liver.

And they impact in the liver, because they're too big to go through the presinusoidal (Phonetic) capillaries.

So they're stuck in the liver, and your body says wait a minute, that's not me.

That's foreign.

Now why they didn't say that about the worms is a good question.

But they say that about the eggs.

So your body responds and makes this great big lesion up here called a granuloma around the eggs in your liver.

And eventually in some people, they go
on to form what's called peri-portal fibrosis in the right-hand picture.

[00:19:40.266]
Now what's wrong with that liver?

[00:19:42.656]
It's not in somebody.

[00:19:46.846]
They had to kill -- somebody had to die to get that.

[00:19:49.086]
And they died because schistosomiasis over is a long period of time built up a lot of fibrosis

[00:19:57.466]
around the vessels in your liver, and your blood can't get back up to your heart.

[00:20:03.326]
So that's the real problem.

[00:20:05.176]
It's the response of your own body against the products of the worm, the eggs.

[00:20:13.776]
So this is an ultrasound picture of somebody with just beginning peri portal fibrosis.

[00:20:20.146]
And you can see the little -- sort of donut-like shapes up there and down below here,

[00:20:25.916]
a little bit of banding on the right.

[00:20:28.246]
It's not so bad.

[00:20:30.546]
But it will get worse of the and it will end up looking like this,

[00:20:35.056]
and your whole liver is blocked off in terms of returning blood flow,

[00:20:39.026]
and that's the worst scenario in schisto.

[00:20:42.656]
There's another kind of schisto that doesn't effect your liver so much

[00:20:47.106]
but events your bladder and your uri-genital tract.
And if you look at the -- up on the right-hand side we have a very, very old picture that was taken -- it's simply an x-ray. There was no material injected into this person. And yet you can see the outline of the bladder. That big, almost sort of circular thing. If your bladder is calcified like that because you have schisto eggs in it, it doesn't contract. Bladders are supposed to go down and up, down and up. This just sits there. Which means you have a really bad problem. So the three main species are hematobium (Phonetic), which is what causes this. Japonicum (Phonetic), and mansani (Phonetic). And they can cause a lot of trouble. But this is what it really looks like in the field. What you see in the upper left is a young man in Cairo who has -- had systemic schistosomiasis, the worst form. But what you see on the right lower part is a picture of kids in a village outside of Cairo
where the prevalence of schistosomiasis is about 70%.

Certainly in this age group, except for that jerk over there that got in the picture.

But in this age group it's basically a 70% prevalence.

So 70% of those kids have schistosomiasis.

And one of them is going to get sick like this kid if we don't treat them.

I'm not going to spend any time on this, but I think it's important to talk about subtle morbidity.

There's a guy named Charlie King (Assumed spelling) who's done a number of studies.

One of them has really shaken the schistosomiasis world called Meta Analysis, where you bring together hundreds and hundreds of papers and try to analyze them all together.

And what Charlie did, and his colleagues did, was go through all the literature looking for measuring, in this case, hemoglobin in people with schistosomiasis.

And the -- what you get out of a meta analysis is called a forest plot.

And if things are on the left-hand side of that vertical line, that's not so good.

And what he found was that people with schistosomiasis had significantly less hemoglobin
in their blood than did non-infected people.

Now people where they have schistosomiasis have a lot of other things too.

So maybe this wasn't all due to schistosomiasis.

So the other thing they did was they looked for other papers, and there weren't nearly as many

of them, but other papers where they looked at the change in hemoglobin after you treat with Praziquantel.

And praziquantel will only cure schistosomiasis and one or two other worms, but not malaria, not other things that cause hemoglobin loss.

And what they found is afterwards you moved things over to the right-hand side of this forest plot, which is good.

So they came up with this kind of evidence from a meta analysis that says that schisto really has perhaps even a broader public health impact than the serious disease.

Now if you have the serious disease and you're going to die, you don't care about the population.

But if you're talking about public health the main impact may be this subtle morbidity, not just the 5% or so that die.

So we still have to diagnosis schisto by looking
in the stool and doing -- looking in the urine.

[00:24:27.246] But these are the eggs.

[00:24:28.646] The one with the sort of funny-looking spine on the side is an S-mansonite (Phonetic) egg,

[00:24:33.806] and the one with the turned-out spine is hematobium.

[00:24:38.156] So this is kind of messy.

[00:24:39.716] This keeps most people out of parasitology.

[00:24:42.466] I don't know why it didn't keep me out, but you know, you can make your own conclusions.

[00:24:46.996] I did toilet train normally, but -- this is where you get it.

[00:24:54.046] You get it where it's blue and where it's green and where it's yellow.

[00:24:59.796] And one interesting sort of side fact from this map is

[00:25:05.016] that in the new world we didn't have schistosomiasis until the slave trade.

[00:25:09.956] S-mansonite and hematobium both live in Africa.

[00:25:16.086] Both came over on the slave trade, but only one of them established in the new world.


[00:25:23.116] There's no hematobium in the new world.

[00:25:25.306] Came over with the slaves, didn't last.

[00:25:28.206] Why? We don't have that snail.

[00:25:32.636] It's snail-specific.
We have the snails in Brazil and Venezuela and Puerto Rico that can transmit S mansonite, they just happen to be there.

But we don't have the right species to transmit hematobium.

So it didn't make it.

So here I am telling you about the snails, and you know,

this shows you all the different kinds of snails.

Now isn't that really interesting?

However, I have a friend here who said wait a minute, wait a minute,

I -- this is a disease of snails.

Well, Suzy Sudanica here is right.

This is a disease of snails!

They get sick too.

So I think it's important that Suzy gets her due.

So we do have something on here that says this is also a disease of snails.

Suzy wouldn't let me get by without saying that.

So -- why do you get schistosomiasis?

Well, we know why Suzy does, it's the same reason we do.
Somebody poops in the pond or pees in the pond.

And you have human, and with one of the species you have animal reservoirs.

Water is essential.

Has to have water.

You have to have fresh water.

You have to have fresh water because that's where these snails live.

Not this one, but most of these snails.

You have to have the right snail host, they have to have some place to live,

it has to be someplace that people defecate or urinate.

Adult worms.

Adult worms contribute because they make the eggs.

And they make the eggs for a very long time.

So if you're talking about a chronic infection, you have lots of chances for transmission.

And that's important.

But it's a very focal disease.

So one village may have 60% prevalence, and down the road 30% or 5%.

So it's really hard to map out where you have to go to treat everything.
So the transmission dynamics look like this.

You have water, you have snails, you have people.

You have people contaminating the water and people contacting the water.

You have to have both.

And when you do in that little intersection you get great transmission.

It sounds a little tenuous, but I'm here to tell you it works really well in the field.

So how would you attack this?

Well, sanitation and water and health education.

That's a good idea.

It probably doesn't work very well if you don't give people alternatives.

The sanitation has to be there or the clean water has to be there.

Snail control can work, but the things we poison snails with also kill fish and other stuff,

and they wash out, and they're very expensive.

Hemo therapy is the current control.

And that means drugs.

Praziquantal.

So the current control isn't to stop transmission, it is to stop people being sick.
If you give Praziquantal about once a year to children in school,
[00:28:56.296] they don't get sick from schistosomiasis.
[00:28:58.746] Their subtle morbidity is lower, although it's hard to measure that.
[00:29:04.206]
[00:29:05.576]
[00:29:08.496] So we'll come back to public health control part in a minute.

First we're going to just mention some of the research.
[00:29:11.336]
[00:29:15.666] So as an immunologist there are lots of fascinating parts about schistosomiasis.

Lots. This host-parasite relationship has developed over a very, very long time.
[00:29:21.786]
And I think it's a large amount of hubris for us to think that we're just going to interrupt it.

But even if it wasn't a bad disease, which it is, it would be interesting to an immunologist.
[00:29:34.436]
So what are the major basic bio-medical research questions about human schistosomiasis?

Well, we'd like to know what correlates and what the mechanisms are to resistance.

There is some resistance, and I would say show you a little of that.

What are the correlates and mechanisms of subtle morbidity.

We're not sure how to measure it.

What are the correlates and mechanisms of severe morbidity.

Why do 5% get sick and die
and everybody else doesn't.

[00:30:02.246] We don't know that.

[00:30:03.876] Does schistosomiasis prevent auto
immune diseases and atopic allergy?

[00:30:08.816] Well, there's some evidence that that's so.

[00:30:11.376] Now does that mean everybody ought
to go out and get schistosomiasis?

[00:30:14.786] No, it means basic scientists ought to
figure out why, and then be able to apply it
to auto immune diseases and allergies.

[00:30:19.746] Transplantation.

[00:30:23.736] If that worm that lives for 40 years, if I could
do that with a kidney, I'd be rich and famous.

[00:30:30.906] How does it stay in there?

[00:30:32.206] We don't know that.

[00:30:33.946] So asking those sorts of questions
in schistosomiasis can shed light
in other areas of bio-medical research.

[00:30:38.376] So what's our lab's current research?

[00:30:42.336] [00:30:44.466]

[00:30:47.956] Well, it takes place in Kenya.

[00:30:50.046] And we work with a group called Sand Harvesters,
and another group called Car
Washers and then children in school.

[00:30:58.986] So these are the three groups.
The car washers wash cars.

Well, big deal.

Down at the car wash -- no, in Tasuma (Phonetic) that's lake Victoria.

So they drive the cars into Lake Victoria, in this case most of them are trucks and vans,

they drive them in, then they slosh them down with water.

And they're standing in the water the whole time, which is how you get schistosomiasis.

The sand harvesters are even more exposed.

They're standing chest-deep with a shovel, harvesting sand off the bottom of the lake into their boat, pull the boat over to the shore, empty it out by standing in the lake and shovelling it on to shore.

Haggle with somebody about the price, and then load the dump truck up.

That's harvesting sand.

The kids are in school right there, but they're also in the lake much of the time.

So Tasuma in the western part of Kenya, my post-doc and technician --

one of my technicians is there right now.

I'll be joining them -- I'll be there Saturday.

Leave Thursday.
Takes a long time to get to Tasuma.

So these are the people who do most of the research.

We also have field teams -- large field teams and laboratory teams in Kenya.

But here we have Carlo Black, Michael Gallen, and Jen Carter (Assumed spellings)

who are post-doc graduate student technician in the lab.

Evan Seccor is a collaborator left over from CDC days, and Diana Kurangen and Paula Winsey are on site all the time, fortunately, because I'm not.

So the epidemiologic question in the beginning was

if we treat this guy how long does it take before he gets reinfected.

And you can only do that by longitudinal studies, which have a whole different feel

to them than everything else I've ever done.

And what we found by treating these guys, following them up by doing stool exams

about every four weeks to see when they got eggs in their stool again.

So we did this for years and years, we've been doing this for 14 years out there.

Some of these guys have worked with us for 14 years.

And in the paper that we published a couple
of years ago, now six years ago in lancet,

what we found by following these guys
was a little bit surprising to us.

We found that the time it took for
them to get reinfected differed.

We thought everybody might be the same.

We hopped they weren't, but they
turned out not to be the same.

Some got reinfected quickly,
some got reinfected more slowly.

Told cars, and we called them resistant.

And it was exciting, because the bottom
line here was that when we treated them
and retreated them because they got reinfected,
retreated them and retreated them, they got --

some of them got more and more resistant.

And when you do a longitudinal study
in basic science areas what you find
may or may not ever repeat itself.

So you've worked five or
six years to get these data,

then you have to do it all
over again and see if it works.

Well, fortunately for us, it did.

And what this slide shows is that some
people have to wash a lot of cars,

over 450 cars before they get reinfected.
That's the red line at the top.

And some people get reinfected after only about 300 cars.

And that's the blue line.

And the number of reinfections is across the bottom.

That's a lot of reinfections and retreatments, but if you do that, some of the people who start out low slowly but surely become more resistant.

And for an immunologist, that's exciting.

So it did happen again.

We found what we found the first time.

And the hypothesis that we work on is that killing worms is what induces resistance.

Just having worms doesn't seem to do it.

But having dying worms in your blood vessels seems to.

At least that's what correlates with the data.

If that's a mechanism or not, we don't know.

So we proposed that on worm death, multiple worm deaths over time, you end up getting more resistant.

And we wanted to look at the immune responses that correlate with that.

So how do we do this research?
Okay, you work with the people, always have to work with people.

You explain what you're going to do.

You've already gotten IRB approval and everything for what you do, but that doesn't get it done.

You have to deal with people, and you have to convince them to stick their arm out and give you blood every once in a while and to give you stool and you may think, yeah, that's cheap.

It's not so easy.

So you have to work with people.

Get their consent, all of that stuff.

Then you diagnose them for schisto, other worms, malaria, and HIV, because they're all common there.

And if you don't understand what's going on with those you don't know what's going on with schistosomiasis.

Then you bleed them, take the blood back to the laboratory.

So here we are, bleeding out by the car wash.

And then going back -- we have regular laboratory with biological safety hoods,
you know, cabinets, the whole thing.

Deal with the blood carefully, because 30% of the car washers have HIV.

Deal with the blood, put up cultures, do immunology.

That's what you do.

Then you get the data from those cultures or whatever you're doing,

the phenotyping by flow cytometry or whatever.

And then you try to analyze it in relationship to what you know about that patient and what you know about that group of patients.

And the more you know about them epidemiologically and background-wise,

the better you're going to be able to interpret your numbers.

Because without that, you just got numbers.

And then you publish papers and try to get more funding,

and each time you try to improve your question.

That's what this is about.

So I'm not going to spend any time on the results of that.

Just that over the last six years we've been publishing papers about things that seem to correlate or don't correlate with resistance, and we are still doing so.
That's why Kara and Hillary are out there right now.

And why Jen is trying to figure out an assay.

Did she finish in time to get here?

I don't know.

Anyway, figure out an assay that I will take out when I go on Thursday.

So you get all these correlates.

So what? Well, you publish papers, you get grants.

Cool. But that's only part of why you're doing this.

This is too much trouble to do just for that.

So that's a good question.

So what. What we hope is to learn enough to form a composite of what is needed.

to really give you substantial protection against schistosomiasis.

Because those are the responses that we would like to engender with a vaccine some day.

Just any old -- as you heard from Steve Hoffman if you were here in January,

just any old response isn't what you want.

You want certain immune responses.

So we're trying to define what those immune responses are that correlate with protection
so that you can go after those responses.

And also immunology, as I said before, is immunology.

What we learn here are the same mechanisms that are going on in any immunologic situation.

Infectious or otherwise.

And I think that's a very important point.

So the heart of our research in Kenya is -- oh, goodness, not that one.

Yeah, there.

Transmission sites.

So we have the children, we have the sand harvesters,

we have the car washers,
and we have the village.

This is what the village looks like.

Now we only study villages some, because you can't control it as well.

You don't know the exposure like we do with the car washers an the sand harvesters.

But you can see that the women are down washing clothes.

This is what they do.

That lake has schistosomiasis and they have the potential of getting it.

So now we'll put on a different
hat, not as a basic immunologist,

[00:39:51.616] not as a basic immunologist
doing schistosomiasis,

[00:39:55.536] but as a global health researcher.

[00:39:58.116] And someone that's involved in the other end of
what I call the research to control spectrum.

[00:40:05.996] Now this spectrum or -- we
hope it's a spectrum anyway --

[00:40:11.816] goes from basic research at the
bench all the way to intervention.

[00:40:17.126] Or you could say bench to
bedside if you're talking medical.

[00:40:22.576] But bench to intervention if
you're talking public health.

[00:40:25.456] And what you have are several levels of what
people do to control these kinds of diseases.

[00:40:32.916] You have control, which is
what we do for schistosomiasis,

[00:40:36.876] and we're only controlling morbidity by
this annual treatment with Praziquantal.

[00:40:42.226] You have elimination as a public health
problem, or in a given area completely.

[00:40:47.966] You have -- and that's the infections.

[00:40:50.996] Or you have eradication.

[00:40:53.116] Now we've eradicated small pox.

[00:40:56.216] We haven't yet eradicated
guinea worm, but we're close.

[00:41:00.956] We haven't yet eradicated
polio, and it keeps jumping up

[00:41:07.156] and biting us, but we're still working at it.

[00:41:09.916] But in parasitic diseases (Inaudible) 
is as close as we get to eradication.

[00:41:15.116] Extinction is when it's gone.

[00:41:17.956] Small pox is gone.

[00:41:19.426] It's in a lab -- a couple 
labs, hopefully securely.

[00:41:24.456] So what you do public health wise depends a lot 
on what you want to do, what you have the tools
to do, what you have the public will to do.

[00:41:30.846] Conceptually, these are very different things,

[00:41:36.936] and they often get mixed up, 
but they're very different.

[00:41:39.916] So guinea worm is an eradication program.

[00:41:43.296] Onicacyasis (Phonetic) is a control program, 
lymphatic filariasis, which you've heard

[00:41:48.546] in this series about, is elimination.

[00:41:51.376] Schistosomiasis is morbidity control, and 
that's what we're going to talk about.

[00:41:56.846] So a few years ago the world health assembly, 
which is all the ministers of health from all

[00:42:02.736] over the world, sat down 
in Geneva and decide aid

[00:42:07.356] that they would pass world health assembly 5419, which is a resolution on schistosomiasis

[00:42:14.726]
and soil transmitted helminths (Phonetic).

[00:42:17.946]
The burden of disease is huge.

[00:42:19.676]
For soil transmitted helminths
it's over a billion people.

[00:42:22.916]
Yeah I know, it's -- in 2009, a billion
doesn't sound like much any more.

[00:42:27.426]
We're talking hundreds of billions
here and there and everything else.

[00:42:30.346]
But 2 billion people is still a lot of people.

[00:42:33.886]
To do these things you really
have to have lots of partners.

[00:42:40.566]
That's probably one of the biggest hurdles.

[00:42:42.946]
But these partners all have to get along,
and they don't all have the same goals.

[00:42:46.736]
Well, they all have the same final answer goals.

[00:42:49.666]
They don't all have the same
reasons for doing it.

[00:42:52.516]
So it's difficult to put these things,
these resolutions, into action.

[00:43:00.146]
And one of the things that we'll talk
about in a minute is operational research.

[00:43:05.716]
Because there's still questions that you have,
even though you have an eradication program
or an elimination program or a control program,
there's still questions that we don't know
about that will help that program.

[00:43:19.306]
So this -- about six years ago the Gates
Foundation funded something called the
Schistosome Control Initiative, or SCI.

It operates out of Imperial College in London, and over the years they have had 40 or $50 million.

And what they do is they buy Praziquantel, they donate that to ministries of health in six or eight countries Sub-Saharan Africa.

And they help the ministry of health deliver it.

They figure out the organizational needs, logistical needs, and they help get it done.

And they facilitated over 50 million treatments with Praziquantel in that time.

So that's a lot of treatment.

And they've dewormed more people for soil transmitted helminths, which kind of goes along with it, with albendazole.

So in the countries listed on the bottom there are country-wide programs.

And they're in place and they're being shored up by this enormous amount of Gates and now USAID money.

And that's a good thing.

Because if we can do it, we should be doing it.

There are a lot of people that benefit from this.
But the Gates Foundation has also just funded a program here at UGA.

It's called the Schistosomiasis Consortium For Operational Research and Evaluation.

Or SCORE! I left off the exclamation points on the slide.

So this is a new program.

It's just starting.

It's hectically just starting.

But it's a consortium to do operational research.

Now that's not basic science, it's operational research.

It's defined, it's finding out what control program managers in the field need to know to do their job better.

And their job right now is handing out pills.

So part of what SCORE will do will be try to figure out better ways to hand out pills.

How we convince people to take these pills if they don't think they're sick?

Well, that's a job.

So it will be run out of UGA but it will involve investigators from around the world through sub awards.
So there will be a lot of sub awards.

And I should mention that the president's venture fund here at UGA gave me some money to help me set this consortium in motion before the Gates came through, because that was a huge help.

Let you travel around and talk to people rather than do everything by e-mail.

So SCORE. There were some ground rules established when the Gates called me and asked if I would do this.

And they were really pretty firm about their ground rules.

Operational research only.

You know, no amount of wheeling and dealing with them would make me --

allow me to study lymphocytes jumping through hoops.

This is not what they do.

This is operational research.

Not basic science.

We're not supposed to deal with estraponicum, which is the one in the far east.

I may have some people on my advisory board who deal with estraponicum,

but that's not where the money's going.
There's no drug development, no vaccine studies,
and we're to work with existing control programs.
Well that makes sense.
And we're also supposed to work as broadly as possible with the schisto community,
which sounds really good until you try to do it.
Anyway, those are the parameters that I was given.
Now all of this is in relationship to mass drug administration, M D A, with Praziquantal.
So these will be collaborative studies, they will be complimentary studies.
They will be done in relationship one to another.
So the -- there are three in the Gates terminology, there are three objectives.
Each one has a series of activities below it.
The first objective is to evaluate alternative approaches to control schistosomiasis.
And to eliminate schistosomiasis in settings with low or seasonal transmission.
Well, elimination is really, really hard.
So we'll see about that.
But the activities.
The first two activities actually go together and we'll be having a meeting here
with about 25 people from around the world in April to try and get a handle to the existing data.

What do we know works or doesn't work in control of schistosomiasis.

So these people are going to come together.

I sent the letter of invitation out about two hours ago.

Third week of April, come together for three days, and try to sort out what we already know, so we don't start trying to reinvent that.

The next activity is how do you sustain control?

Okay, the schistosomiasis control initiative did a great job in those six countries and brought the prevalence way down.

If you leave and come back in five years, it will be right back where it was.

We know that.

So how do you keep the slope of return as low as possible without spending $10 million every year.

So we'll be comparing different delivery systems, and that will be research, but it's very practical research.

The next one will be how do you
achieve real elimination in some place

that already has low transmission.

I call this the kitchen sink approach.

We'll throw everything at it.

We will do snail control, we will do
latrines, we will do lots of health education,

and we'll use drugs, and we'll
do everything we can think of.

Maybe reroute some water ways,
engineering kinds of things.

And the next one is even a bigger challenge
in that how do you for least amount

of money get prevalence load from starting
from someplace like that village in --

outside of Cairo that I showed
you that had 70% prevalence.

How do you get it down, how
do you really get it down.

And we'll be doing that in relationship
to another series of questions

that are a bit more basic
science that I'll mention now.

Oh yeah, we'll also be doing
community health education

and cost (Inaudible) throughout all of this.

So the second objective is to develop
the tools needed for global effort

to control and eliminate schistosomiasis.
And we have a bunch of activities that are more on the diagnostic side,
because we don't have good diagnostics.
We're still looking at stools, and it's 2009.
Now come on, we can do better than that.
So this money will fund some people to try and do better than that.
For diagnostics in snails, I guess Suzy Sudanica gets her day too.
And in people.
Because that's one way you can monitor it in the snails.
And they're cute, too.
One of the things that we're going to have a meeting on even before
that bigger meeting is we're going to have, like, five people from around the world who look
at population structures of schistosomes by micro satellites, et cetera, come together,
work out a unified protocol -- I hear you chuckling --
we will work out a unified protocol because that's what we'll fund.
And then we'll be able to look at the population structure
about which we know nothing at this point.
Under mass drug administration.

[00:51:00.106] Mass drug administration, one drug -- does this sound familiar?

[00:51:03.896] Sounds bad.

[00:51:05.206] Sounds like resistance.

[00:51:07.376] So we don't know the mechanism of Praziquantel action,

[00:51:11.316] so we don't know what to look for, for resistance.

[00:51:14.346] But at least if we have a population structure

[00:51:17.116] under study while we're doing mass drug administration we may see some changes

[00:51:22.076] in the genetics of the population that will give us some clues that something's going on.

[00:51:26.916] And then we're going to look at subtle morbidity and try to come up with some outcomes

[00:51:31.476] that are better than what we have.

[00:51:32.856] And the third objective is really simply to try and take --

[00:51:37.176] this won't kick in until like the third year, where we try to take the findings

[00:51:41.316] and actually move them into guidelines at WHO and places like that.

[00:51:48.496] So the management structure will be -- there will be three components.

[00:51:52.276] The sec tear Yacht, which will be myself, consultant from Atlanta named Sue Binder,

[00:51:58.386] Charlie King who is the guy who did
that meta analysis, associate director

[00:52:03.396]
for management, and an administrative assistant.

[00:52:06.596]
And then we'll have the technical
working group that will meet every year

[00:52:10.136]
to compare what we're finding, which will be
the 15 or 20 PIs of the various sub awards.

[00:52:16.106]
Then we'll have an advisory group
which I'm just now inviting.

[00:52:19.556]
So how is it going to work?

[00:52:23.476]
We're going to have these meetings, we're
going to select solicitations and proposals
to do the protocols that
come from those meetings.

[00:52:29.866]
Those will be awarded.

[00:52:34.986]
Then they have to get out the door,
then people will start doing something.

[00:52:41.646]
We'll have annual meetings to
compare what we're getting.

[00:52:45.196]
And it will be a lot of meetings,
that's what a consortium means.

[00:52:52.656]
So very quickly, global health
and global health research.

[00:52:55.626]
Do you know these public health workers?

[00:52:59.496]
Hmm. They're the best-known public
health workers in the world.

[00:53:04.976]
Bono and Bill Gates.

[00:53:07.946]
Global health has changed
enormously over the last ten years.
And a lot of it is because of these two guys.

And Melinda.

Don't leave Melinda Gates out.

So Senator Arlen Spector said when they were looking at the FY 2008 budget, a healthy world is a good thing for America.

Health diplomacy must be the foundation of our foreign policy.

It's called winning hearts and minds.

It's called showing your best side.

So the question for the people in the audience, especially the undergraduates and graduate students and post-docs, how do I get to work in global health?

Now I'm going to start by saying how Dan Colley got to work in global health.

As David pointed out, I went to high school in western New York.

I went to an even smaller college in central Kentucky.

I married the right woman who would put up with all this stuff when I was there.

Was worth the trip, folks, let me tell you.

Went to graduate school at Tulane, in transplantation and immunology, and microbiology.
They actually had a really good tropical medicine group at Tulane then, and I shunned those people. They were the ones who dealt with those yucky worms and stuff. You know, they had display cases full of horrible-looking things. We stayed away from them as much as possible.

And then I went up to Yale and did my post-doc in very basic science -- very basic. I mean, this was before we knew a lot of stuff.

Then I took a kind of a wiggle, and I went to Brazil.

I had this opportunity to go to Brazil and teach a course in immunology and reorganize some research that was going on.

And the research was in schistosomiasis.

And I couldn't spell it.

So I went anyway.

And I came back to a real job that I rose through the academic ranks, did all those things that David said in Nashville.

And then I took another wiggle.

I'm not really sure why I did this wiggle, but I did.
And I went to the CDC, and lo and behold
I was the director of the division
of parasitic diseases -- not ever having had
an epidemiology course or parasitology course.

He didn't ask.

It wasn't like I, you know, lied
to him on my resume, you know?

And then I came here, for
which I am very, very grateful.

Because it was time to leave CDC.

I learned a lot and I had done a lot, and
I was real pleased with my time there,
but I didn't want to end up there.

And so Rick Carlton made a
place for me here, and I came
and I've been living happily ever after.

So do you see a well thought out path here?

When someone comes in my office
and wants to know how they can work
in global health they always
want me to tell them a pathway.

Well, this one skipped around a bit.

I don't see a path here.

So how you get to work in public
health, in global public health.

What kinds of opportunities are there
for people like you in public health.

[00:56:29.746] I beg you to remember the continuum, that spectrum that I very strongly believe in,

[00:56:36.816] but which is really hard to make happen.

[00:56:39.786] The spectrum from bench to implementation and intervention is fraught with problems.

[00:56:47.016] Not very many people speak the whole language.

[00:56:50.296] You don't have to speak the whole language.

[00:56:51.796] You just have to be able to speak the one over from you.

[00:56:55.076] At least go out and have a beer with them, you know, maybe you'll find they're interesting.

[00:57:00.116] But remember the continuum.

[00:57:01.476] Because there are things for people to do all the way along that continuum.

[00:57:06.656] Whether they're a health economist or a journalist, even they do global health.

[00:57:14.306] They actually do a lot for global health, because without them nobody hears about it.

[00:57:18.906] So you can do global health whether you're a basic scientist or an MD,

[00:57:24.066] or a public health official, or a publicist.


[00:57:32.196] What education and training do you need to work in global health?

[00:57:35.226] It depends on which part of that spectrum you want.
Now you may not know which part.

So cover your bases.

Now if you want to treat people --

okay, if curing people is your important thing you've got to get an MD.

It's against the law to do it if you don't.

I don't treat people.

I'm a Ph.D..

I give people pills to give to people, but I don't treat people.

Okay? So if treating people is important, you go to medical school.

You do your house staff training, become a real physician.

Then you do a fellowship, and you do it in anything but -- maybe infectious diseases, maybe something else, maybe in pediatrics.

And then you do that research and things that get you into that.

Now if you want to do research on global health issues, you go to graduate school.

You can do research if you go to medical school.

No reason you can't.

But if you go to graduate school you can't treat people.
So got to remember those things.

[00:58:32.686] But you can go to graduate school in almost anything

[00:58:35.886] and end up doing global health -- almost anything.

[00:58:38.996] It doesn't have to be immunology like me.

[00:58:42.526] Although I recommend that highly.

[00:58:46.126] If you want to set policy, well, you can be an MD, a Ph.D., have an MPH,

[00:58:52.296] have just experience -- lots of different things.

[00:58:55.836] You can work at WHO, you can work at your -- you know, at your local health department.

[00:59:00.696] If you want to teach, depends on what level you want to teach.

[00:59:04.796] If you want to teach this stuff, fine.

[00:59:07.556] We need people to teach this stuff.

[00:59:10.166] So how do you want to make your contribution to improving global health.

[00:59:15.206] You just need to think about all the different options, and there are a zillion of them.

[00:59:20.106] So here in the Center For Tropical and Emerging Global Diseases we try to turn research

[00:59:24.606] into medical and public health interventions.

[00:59:26.646] We try to promote global and bio-medical research,

[00:59:30.106] and our educational programs here at UGA.
We in CTG are doing global health.

And so are a lot of other people at UGA.

That's the nice thing about this.

That's actually what makes it fun.

Takes lots of people with lots of different talents.

So (Inaudible) of schistosomiasis, 200 million people.

They can't be wrong, must be a real problem.

And it is.

They live in their blood vessels.

We can do something for them now.

We can give them Praziquantel.

If we just give them health education, it doesn't help.

They know the life cycle at the car wash better than I do.

They've been doing this for 14 years, some of them.

They know all about schistosomiasis.

But they don't have an alternative.

They wash cars in the lake because unemployment in adult males in Tasumu is 40%.

And they have a job.
So they're going to go in that lake.

You have to give them an alternative, not just tell them they shouldn't do that.

Research is needed, even in eradication programs.

If you talk to Don Henderson, the guy who was the head of the global program that got rid of small pox.

He will tell you that during the campaign there were findings from research that helped them make the final run.

We need research.

And the research control continuum needs to be real.

Which means people with many different skills need to work together, go out and have a beer together.

Talk about what you do.

Now going to finish up on a couple of slides that prove that it's not all work.

This is where I wrote this talk last week.

That's Lake Tahoe.

We're at Hullwood (Assumed spelling), one of the ski areas around there.

It's really pretty.
But this was -- this was about three days later.

It's also very pretty.

And you forget if you're from Buffalo, you should know this,

but you forget how quiet it is when it snows.

Good to come home from, though.

Really, really pretty.

Now -- now we're out in Kenya.

These are Kenyan elephants and a Tanzanian mountain in the background.

These are the kinds of things that you can do on the weekend, if you work in Kenya.

Don't -- this is -- this is the Mara River.

You should not be like wildebeests and cross the river in this lower left-hand corner.

It's not a good place to cross the river.

Anybody even know what the one in the lower right-hand corner is?

Got it. Nailed it.

Cerval cat.

Took me lots of trips to Kenya to see that.

And we have Kilimanjaro on the left, Mount Kenya on the upper right, the plains of Africa

on the left, and then that's the sunset
from where I usually stay when I'm there.

[01:02:48.996]
It's a really tough job,
but somebody's got to do it.

[01:02:52.536]
So that's all folks.

[01:02:53.996]
Thank you very much.

[01:02:56.516]
( Applause )

[01:03:05.500]

[01:03:13.360]