
A COMIC WRITTEN BY JAMIE HALL AND EDWARD ROSS. ILLUSTRATED BY EDWARD ROSS. SCIENTIFIC ADVISORS: DR. POPPY LAMBERTON AND DR. RICK MAIZELS.

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Another beautiful day in Uganda, on the shores of Lake Victoria.
But something lurks under the water.

Schistosome larvae.

Worm-like parasites seeking out a human host.

And just like that.

She’s infected.
Jane?

Welcome to Uganda! I'm glad you could come and see what we do here.

Ah, Moses. Great to see you!

I'm looking forward to finally meeting the parasites I've been studying, Schistosomes, in their natural habitat!

Then hop in!
WE’VE ARRIVED JUST IN TIME! TODAY WE’RE TREATING THE ENTIRE VILLAGE FOR SCHISTOSOMIASIS.

WHAT A VIEW!

IT’S LOVELY HERE, BUT THIS DISEASE IS A BIG PROBLEM.

IT’S CAUSED BY A PARASITIC WORM WHICH GROWS IN WATER SNAILS BEFORE BURSTING OUT AND INFECTING HUMANS.

BACK IN SCOTLAND WE ONLY THINK ABOUT SNAILS WHEN THEY EAT OUR GARDEN LETTUCE!

YOU’RE LUCKY, THE SNAILS HERE SPREAD DISEASES AND CAN MAKE PEOPLE REALLY ILL.

ABOUT 200 MILLION PEOPLE ARE INFECTED WITH SCHISTO WORLDWIDE, BUT THE VAST MAJORITY OF THESE ARE IN SUB-SAHARAN AFRICA.

IN LAKESIDE TOWNS AND VILLAGES ROUND HERE, ALMOST EVERYONE HAS IT AT SOME POINT OR OTHER.

THIS IS NAMAZZI. NO MATTER WHAT I TELL HER SHE KEEPS SWIMMING IN THE LAKE.

ALL THE OTHER KIDS DO IT! HOW ELSE AM I MEANT TO COOL OFF IN THE HEAT?
Nice to meet you Namazzi. I've come from Scotland to meet Moses and find out about the work he's doing.

How have you been feeling Namazzi?

Not great... I've been off school sick a lot recently.

We call him the Snail Man!

For kids like Namazzi, Schistosomiasis often causes diarrhoea and stomach ache. It takes them out of school and leaves them tired and ill.

Over a long time the worms' eggs can build up in the body, causing even worse problems.

But that's not going to happen to you Namazzi, because you're going to take your treatment and stay out of the water, aren't you?

Sure thing, Moses!

We get free tablets from the World Health Organization, and treating everyone here is easier than first testing whether they have the disease or not.

We treated nearly 2 million people last year!

But there's a problem. When we come back we still find lots of Schistosomiasis. People are getting infected again.
NAMAZI, THIS IS POPPY. SHE’S HEADING A TEAM FROM THE WELLCOME CENTRE FOR INTEGRATIVE PARASITOLOGY WHO ARE THINKING OF NEW WAYS TO BREAK THIS CYCLE OF INFECTION.

I’M GLAD YOU BUMPED INTO ME.

HERE! A FULL COLLECTION OF POOP SAMPLES TO PROCESS!

OH MAN.

HI!

POOP SAMPLES?!

SCHISTOSOME EGGS COME OUT IN OUR POOP. THIS IS HOW PARASITES GET BACK IN THE WATER AND INTO SNAILS.

BY LOOKING FOR PARASITE EGGS IN PEOPLE’S POOP, WE CAN TELL WHO IS INFECTED, AND ALSO EXAMINE THE GENES OF THESE HIDDEN CREATURES!

WHAT HAVE I SIGNED UP FOR?

LET’S GET SIEVING!

WITH THESE GENETIC PORTRAITS WE GET CLUES TO HOW SCHISTOSOMES WORK, AND CAN SEE HOW SCHISTOSOMES ARE RELATED TO EACH OTHER. WE CAN LEARN A LOT FROM THIS.

I SURE HOPE SO!
Well, one problem is that sometimes the medicines don't work.

They don't?

The thing is, each of us has different genes and different microbes living in our guts.

Some people will absorb most of the medicine, others only a bit.

So parasites get different doses depending on who they've infected?

Yes! And if it's not enough and the parasites survive, it gives them a chance to evolve resistance to our medicines.

It also depends on what you've recently eaten.

This is why we're looking at the parasites' genes.

Don't worry Jane, we're working on ways to test for parasites by taking urine samples. Much less fuss!

By comparing different infections we can get clues about how they are spreading and evolving.
Even if we could detect and treat all these infections, the lakes are still full of snails, and the snails are full of parasites.

Many people spend hours in the water washing clothes or fishing, increasing their chances of infection.

And sometimes toilet waste runs straight into the lake. This is how the parasites get from humans back into snails to start the cycle over again.

So, we’ve had to get creative. We don’t just recruit biologists to the fight, but economists, social scientists and even actors.

Actors?

We’ve put on local theatre productions to spread the word on how to avoid infection.

Forsooth, do not poop in the lake!

We’re trying to reach people who refuse or miss treatment—showing them how infection can spread.

Social scientists help us understand the choices people make. For example, people rely on this water for their everyday needs.

Here we’ve stopped people from standing in the water to wash clothes. Now they take water away from the lake, meaning they’re less exposed.
The fact is, poverty has a big impact on disease. Poorer areas often face more problems with sanitation, leading to more disease. This is where Glasgow's economists come in. They work with communities to find effective, popular, and affordable ways to bring toilets and clean water to the local area.

By finding sustainable ways to improve sanitation, we can keep human waste out of the lake, and help break the cycle of infection.

Great for us swimmers!

Um, former swimmers!

And what about the snails? Can we do anything about them?

Sometimes we treat areas with chemicals to kill the snails, but we can never kill them all, and there can be big impacts for the local ecosystem.

I suppose throwing them into your neighbour's garden wouldn't do any good?
I thought that all you needed to stop a disease was a good medicine, but it's so much more complicated than that...

If we can combine more effective treatments with changing behaviours and better sanitation to break the cycle, we'll change people's lives for the better.

And kill off these nasty parasites once and for all!

Kill them off? Don't be so hasty!

Namazzi, this is Rick. Worm-wrangler extraordinaire.

It's true, parasitic worms are a nightmare. But they've been with us since the beginning of human history...

During that time they've evolved some amazing ways to survive in our bodies.

There are many different kinds of parasitic worm. Most have some way of tricking the immune system - the force that patrols our bodies looking out for invaders.

So what?

So maybe parasites can teach us a thing or two.
Many diseases, like asthma, allergies, and some kinds of arthritis are caused when our immune system makes a mistake - targeting something harmless like dust, pollen or even our own bodies.

Getting infected by some parasitic worms may help stop these immune diseases. In fact, there are even trials where patients are getting a dose of worms to help with their illnesses.

Ew.

Well, yes. Even if it helps, having a worm infection is no fun! So, we're trying to pinpoint exactly how these puppetmaster worms manipulate our immunity to survive.

Some worms spit out chemicals that mimic parts of the immune system, dialling down defences. Maybe these molecules can also restrain overactive immune responses.

They imitate our immune systems, and now you want to imitate them?

Exactly!

Hmm, inspired by the worms! Sounds like a joke!

Evolution is a masterful problem solver, and the tools to defeat diseases sometimes come from the strangest places.
I had no idea how much hard work people were doing to make things better for me and my friends.

Parasitic worms make people miserable, take them away from work and school, and can have long term consequences for health.

The hope is that one day we'll have these diseases under control...

And along the way maybe we can benefit from some of the secrets these parasites hold.

Making it safer for me to swim and my dad to go fishing!

One day. In the meantime, just remember you've got people like Moses, Poppy and Rick, from Kampala to Glasgow, working hard to figure out how we get there...
THE WELLCOME CENTRE FOR INTEGRATIVE PARASITOLOGY IS BASED AT THE UNIVERSITY OF GLASGOW. OUR MISSION IS TO DEVELOP A DEEPER UNDERSTANDING OF PARASITES IN ORDER TO DEVELOP NEW TREATMENTS.

FOR MORE INFORMATION ABOUT OUR WORK PLEASE VISIT: GLA.AC.UK/RESEARCHINSTITUTES/III/WCIP/

OR CHAT WITH US @WCIPGLASGOW ON TWITTER.

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LIFECYCLE OF SCHISTOSOMA MANSONI.

CERCARIAE BURROW INTO HUMAN SKIN.

SEWAGE ENTERS FRESHWATER. EGGS HATCH.

SNAILS RELEASE CERCARIAE.

HATCHED MIRACIDIA ENTER SNAILS.

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