

MALARIA

THE BATTLE
AGAINST A
MICROSCOPIC
KILLER



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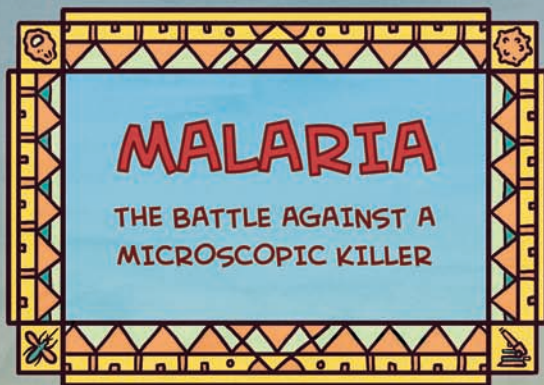
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MALARIA

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MICROSCOPIC KILLER



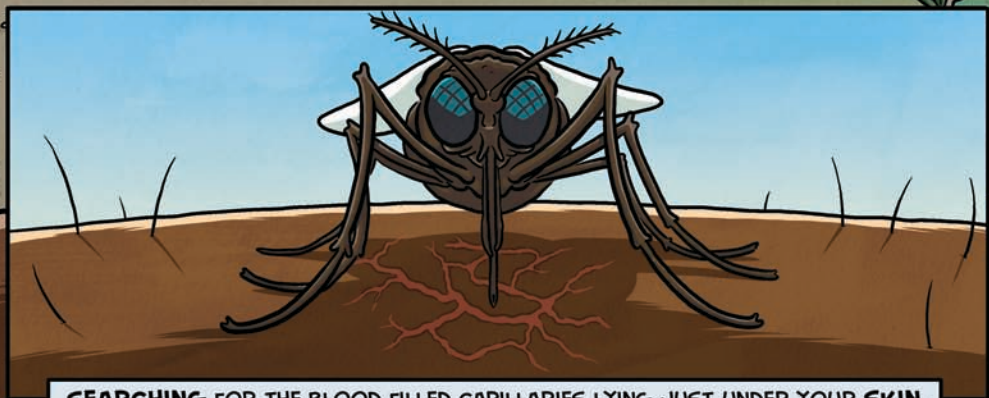
ALL THE MOSQUITO WANTS IS A DROP OF YOUR BLOOD.

SHE CIRCLES IN...




SENSING CARBON DIOXIDE IN YOUR BREATH

THE HEAT OF YOUR BODY AS SHE APPROACHES



SEARCHING FOR THE BLOOD FILLED CAPILLARIES LYING JUST UNDER YOUR SKIN.



BUT THIS INSECT
HAS BEEN HIJACKED BY
MICROSCOPIC PARASITES
CALLED **PLASMODIUM**.

THIS MEAL IS THEIR
CHANCE TO **SPREAD**.

PLASMODIUM PARASITES **SURGE** DOWN THE
MOSQUITO'S MOUTHPARTS AS SHE BITES,
SLIPPING **UNDETECTED** INTO THE BLOOD.

BURROWING INTO THE LIVER, THEY **SILENTLY MULTIPLY**
BEFORE **BURSTING OUT** AND INVADING THE BLOOD.

WAVES OF PARASITES
WREAK **HAVOC** IN YOUR
BODY. THE SYMPTOMS OF
MALARIA TAKE HOLD.

NOW PLASMODIUM HAS HIJACKED **YOU!** AND IT'S READY TO BE PICKED
UP AND **PASSED ON** BY THE NEXT MOSQUITO THAT BITES YOU.

MALARIA IS ONE OF HUMANKIND'S OLDEST FOES.

PEOPLE HAVE BEEN LIVING WITH AND DYING FROM THE DISEASE SINCE THE DAWN OF HISTORY.



IN DUSTY TOMES AND ANCIENT HISTORIES WE FIND REFERENCE TO A TERRIBLE SICKNESS.



FEVER AND SHIVERING.



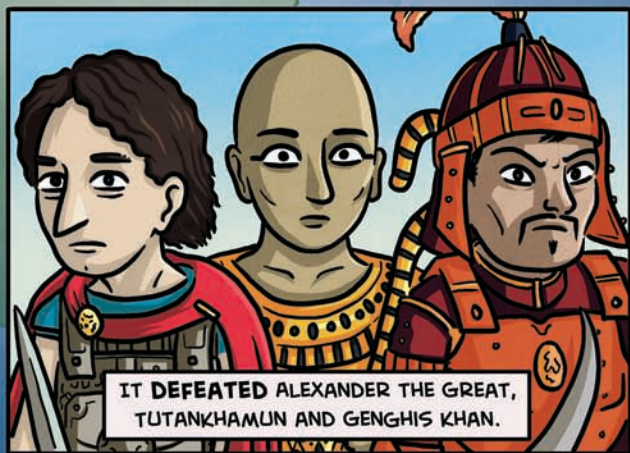
JOINT PAIN AND VOMITING.



CONVULSIONS AND DEATH.



IT IS A DISEASE THAT HAS SHAPED WORLD HISTORY. A KILLER OF KINGS AND WARLORDS.



IT DEFEATED ALEXANDER THE GREAT, TUTANKHAMUN AND GENGHIS KHAN.

AND IT CONTINUES TO KILL TO THIS DAY.

MALARIA STRIKES MILLIONS, FROM GOLD MINERS TO GAP YEAR STUDENTS, FOOTBALLERS TO SOLDIERS.



HALF THE WORLD'S POPULATION IS AT RISK. IT HITS THE YOUNG, THE POOR AND THE VULNERABLE THE HARDEST.



EVEN IF A FARMER IS SICK FOR JUST A WEEK, IT HAS HUGE CONSEQUENCES WHEN HIS CROPS GO TO WASTE AND HIS FAMILY GOES HUNGRY.



THIS IS HAPPENING TO FAMILIES AROUND THE WORLD, CAUSING UNTOLD MISERY AND HAMPERING DEVELOPMENT.

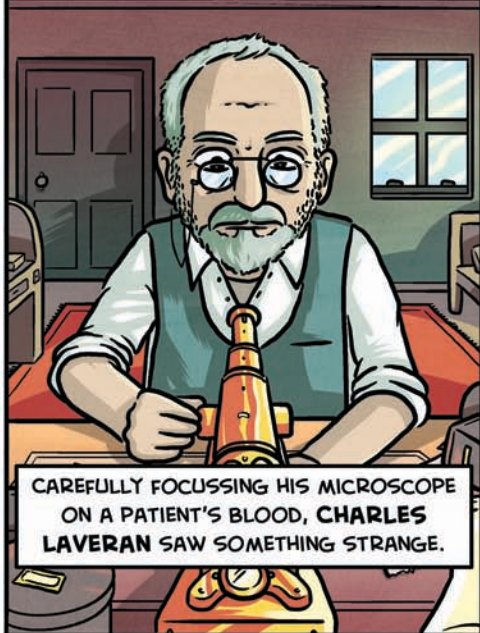


REGIONS WITH WIDESPREAD MALARIA



MALARIA IS ONE OF HUMANKIND'S DEADLIEST DISEASES. BUT THERE IS HOPE...

FOR CENTURIES
PEOPLE HAVE BEEN
TRYING TO **BETTER**
UNDERSTAND THIS
DEVASTATING ILLNESS.



ALGERIA, 1880.

CAREFULLY FOCUSING HIS MICROSCOPE
ON A PATIENT'S BLOOD, **CHARLES**
LAVERAN SAW SOMETHING STRANGE.

ALIEN-LOOKING
MICROBES THRASHING
ABOUT... FINALLY
HUMANS WERE
FACE-TO-FACE WITH
THIS **ANCIENT FOE**.



YET HOW WERE
THESE PARASITES
BEING **SPREAD**?



INDIA, 1897.



DURING THE **SWELTERING** MONSOON SEASON, **RONALD ROSS** BEGAN DISSECTING
MOSQUITOES WHICH HAD FED ON INFECTED BLOOD. THE CONDITIONS WERE STIFLING.



INSIDE THE INSECTS, ROSS COULD SEE
PLASMODIUM PARASITES DEVELOPING.
THE DISCOVERY WAS **ENORMOUS**.

IT WAS **EVIDENCE** OF HOW MALARIA SPREAD,
NOT THROUGH **DIRT** OR **AIR**, BUT THROUGH THE
BITES OF **FEMALE MOSQUITOES**.



THE **MYSTERY** HAD BEGUN TO **UNRAVEL**.

THIS WORK CONTINUES TODAY. TOP SCIENTISTS ACROSS EUROPE ARE PART OF A GLOBAL EFFORT TO UNDERSTAND AND ERADICATE MALARIA. TO DO THAT WE NEED TO ANSWER SOME FUNDAMENTAL QUESTIONS ABOUT PLASMODIUM.



HOW DO THESE PARASITES SURVIVE AND MULTIPLY? WHY DON'T OUR BODIES STOP THEM? WHAT CAN WE DO TO REDUCE THE MISERY THAT MALARIA CAUSES?

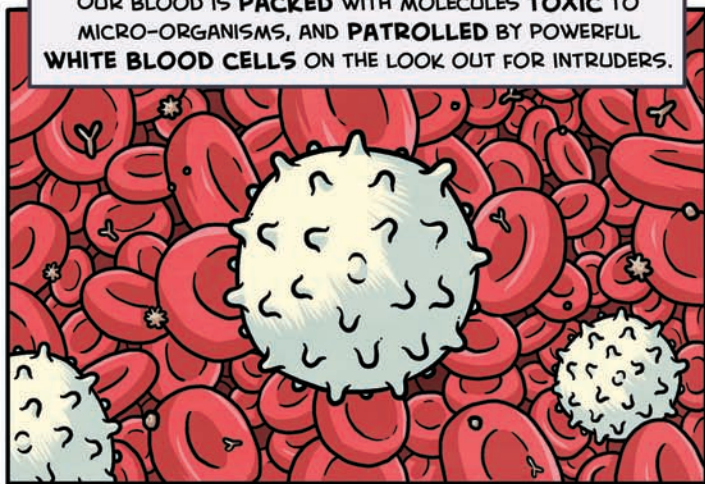


THE HUMAN BODY



THIS WARM, WET HABITAT MAY SEEM LIKE A GOOD PLACE TO MAKE A HOME, BUT TO MICROSCOPIC PARASITES IT IS A PARTICULARLY HOSTILE ENVIRONMENT.

OUR BLOOD IS PACKED WITH MOLECULES TOXIC TO MICRO-ORGANISMS, AND PATROLLED BY POWERFUL WHITE BLOOD CELLS ON THE LOOK OUT FOR INTRUDERS.

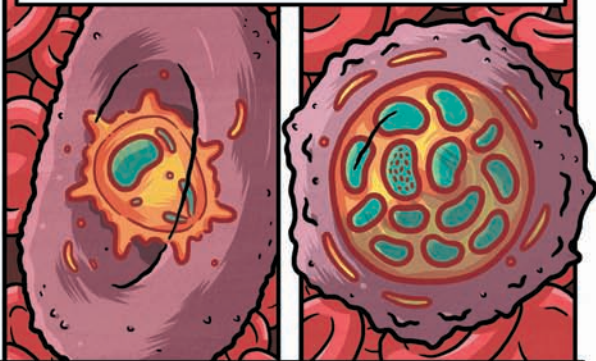


TO SURVIVE, PLASMODIUM NEEDS TO AVOID A FULL-ON BATTLE WITH OUR DEFENCES.

PLASMODIUM FORCES ITS WAY INSIDE OUR CELLS, FIRST IN THE LIVER AND THEN IN THE BLOOD.



HIDDEN FROM THE IMMUNE SYSTEM, THE PARASITE CAN MAKE ITSELF AT HOME, DEVOURING THE CELL CONTENTS AND CHANGING THE CELL'S STRUCTURE.



THE ENSLAVED CELL NOW SERVES THE PARASITE, FEEDING IT WITH NUTRIENTS TO GROW AND MULTIPLY.

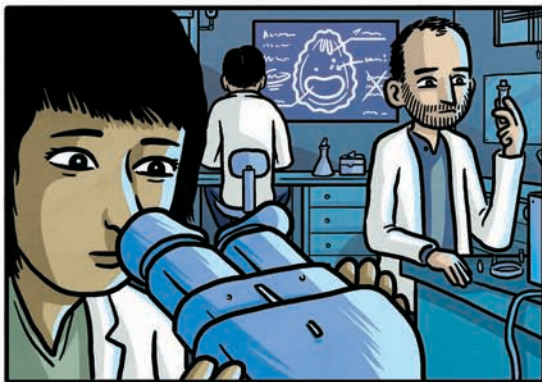


SOON, THE CELL IS EXHAUSTED AND THE PARASITE'S OFFSPRING WILL BURST OUT, READY TO INVADE FURTHER BLOOD CELLS.

THIS DEADLY CYCLE PLAYS OUT IN EVERY CASE OF MALARIA. AS THE PARASITES PROSPER, THE PATIENT WEAKENS.



BY LEARNING WHAT PLASMODIUM NEEDS TO LIVE ITS LIFE, WE GATHER CLUES ABOUT THE WAYS WE CAN STOP IT.



TOGETHER, THE WORLD'S SCIENTISTS ARE BUILDING UP A PICTURE OF THESE ORGANISMS, ONE PUZZLE PIECE AT A TIME.

IT MAY BE **MICROSCOPIC**, BUT **PLASMODIUM** HAS THE **SAME NEEDS** AS OTHER CREATURES.



IT NEEDS **ENERGY**.



A WAY OF **SENSING** ITS SURROUNDINGS.



WAYS TO **ESCAPE** FROM PREDATORS.



A WAY TO **REPRODUCE** AND **SPREAD**.

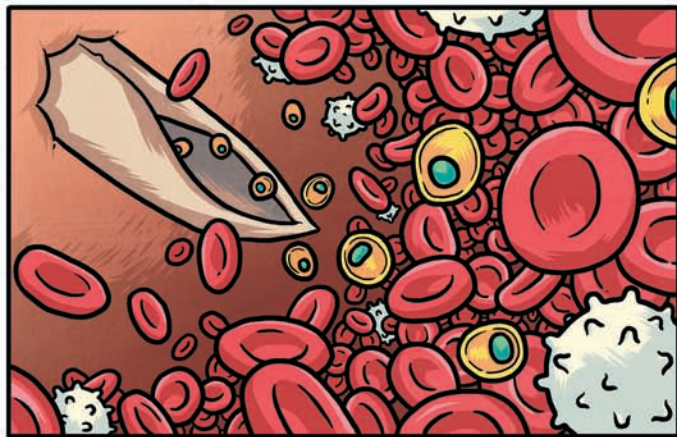
POWERFUL MICROSCOPES ALONE WILL NOT SHOW US HOW THESE **PROCESSES REALLY WORK**.



TO UNDERSTAND PLASMODIUM'S INNER WORKINGS, WE MUST TURN TO ITS **GENES**: THE **INSTRUCTIONS** OF HOW ITS DIFFERENT PARTS ARE BUILT AND REPAIRED.



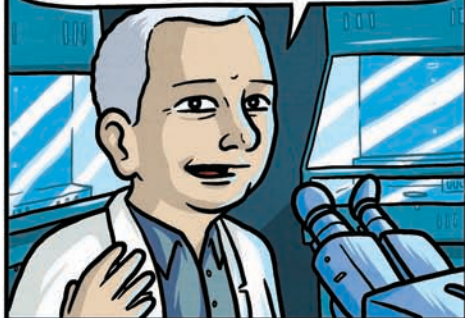
IN THE LAB WE CAN **DELETE GENES** AND SEE WHAT **HAPPENS**. BY DELETING JUST **ONE GENE** WE CAN TRICK THE INVADING PARASITE INTO THINKING IT IS SAFELY INSIDE A LIVER CELL, LEAVING IT **EXPOSED** TO OUR IMMUNE SYSTEM.



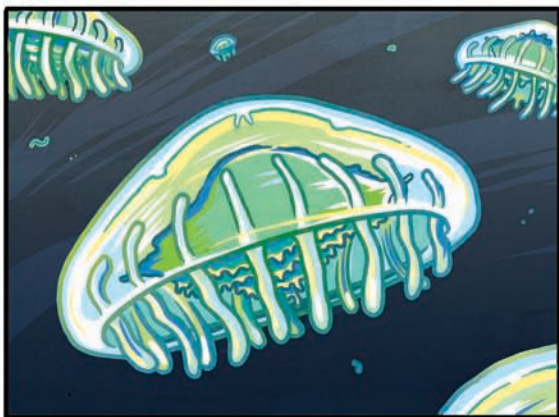
BY REMOVING ONE PIECE AT A TIME WE CAN BUILD A PICTURE OF WHAT EACH PIECE DOES, AND HOW THEY ALL **INTERACT**.



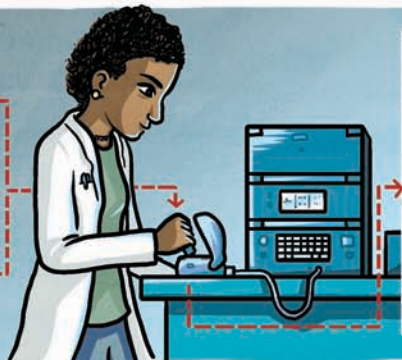
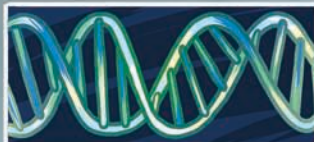
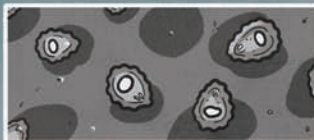
I'M TRYING TO UNDERSTAND HOW PARASITES **BREAK INTO** CELLS, BUT THESE ORGANISMS ARE SO **TRANSPARENT AND TINY** THAT THEY'RE VERY DIFFICULT TO **SEE**.



THE CRYSTAL JELLYFISH PRODUCES **MOLECULES** ALLOWING IT TO **GLOW** IN THE OCEAN DEPTHS.

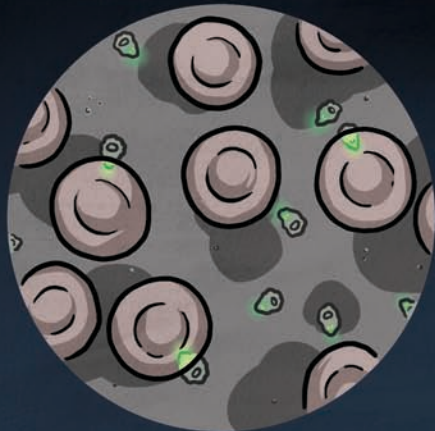


WE CAN TAKE THIS GENE FROM THE JELLYFISH AND ATTACH IT TO THE PLASMODIUM GENES WE'RE INTERESTED IN.



THE **MODIFIED** PARASITES LIGHT UP TO **REVEAL** THEIR INNER WORKINGS.

IT'S A **SPECTACULAR NEON LIGHT SHOW**, BUT USEFUL TOO. WE CAN NOW **CLEARLY SEE** THE DIFFERENT PARTS OF THE PARASITE, AND HOW THEY **INTERACT** AS PLASMODIUM **LOCKPICKS** ITS WAY INTO OUR CELLS.



IF WE WORK OUT HOW THIS PROCESS WORKS, PERHAPS WE CAN FIND WAYS TO **BLOCK** IT.



LOCKED OUT OF OUR CELLS, PLASMODIUM WILL BE AT THE **MERCY** OF OUR **IMMUNE SYSTEM!**

TO INVESTIGATE EACH **SEPARATE PART** OF PLASMODIUM, WE CAN PUT THEIR GENES IN MICROBES THAT ARE **EASIER TO GROW**, LIKE BACTERIA OR YEAST.



LIKE **MICROSCOPIC FACTORIES**, THESE ENGINEERED MICROBES WILL CHURN OUT **LARGE QUANTITIES** OF THE PLASMODIUM **COMPONENTS**, WHICH CAN THEN BE EASILY PURIFIED AND **EXAMINED**.

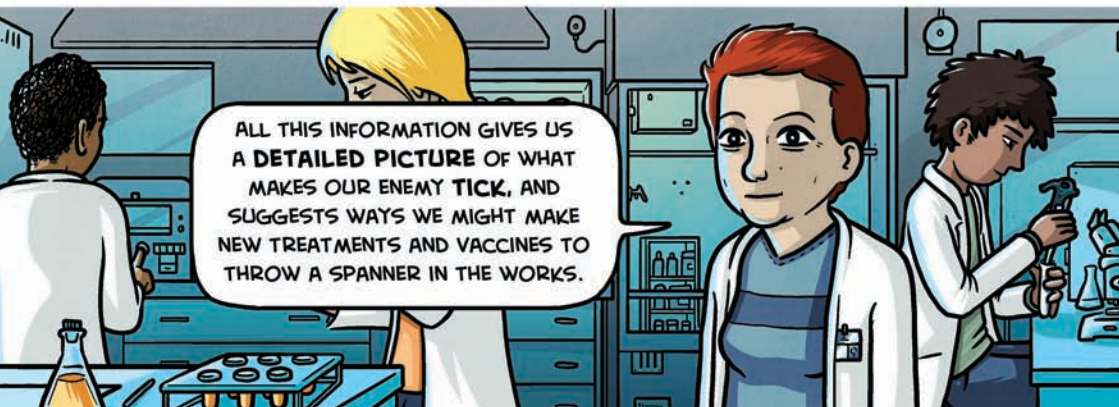



WITH ALL THESE PIECES **ISOLATED** FROM THE PARASITE AND EACH OTHER, WE CAN **EXAMINE** EXACTLY HOW THEY WORK.



IT'S LIKE CAREFULLY TAKING APART A **CLOCKWORK PARASITE**, WORKING OUT WHAT THE DIFFERENT PARTS LOOK LIKE, AND WORKING OUT HOW THEY FIT TOGETHER AGAIN.

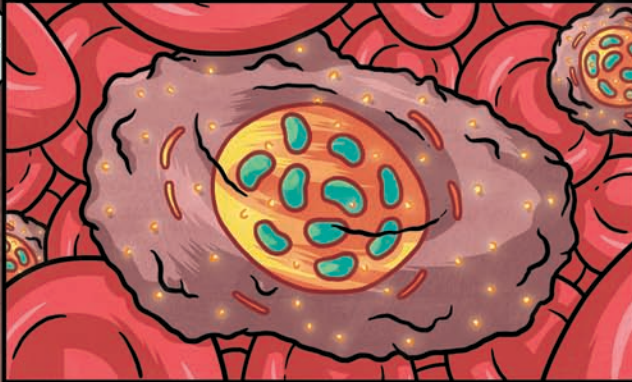
ALL THIS INFORMATION GIVES US A **DETAILED PICTURE** OF WHAT MAKES OUR ENEMY TICK, AND SUGGESTS WAYS WE MIGHT MAKE NEW TREATMENTS AND VACCINES TO THROW A SPANNER IN THE WORKS.





OUR OWN IMMUNE SYSTEMS
COULD BE OUR MOST POWERFUL
WEAPON AGAINST PLASMODIUM.

TO MULTIPLY, THE PARASITE MUST ADD TINY **MARKERS** TO THE **RED BLOOD CELL** SURFACE, ALLOWING IT TO COLLECT NUTRIENTS AND RESPOND TO ITS SURROUNDINGS.



THESE **MARKERS** ARE A SIGN THAT THE RED BLOOD CELL HAS BEEN **INFECTED**, AND THEY WILL EVENTUALLY BE **SPOTTED** BY THE EVER-ADAPTING **IMMUNE SYSTEM**.

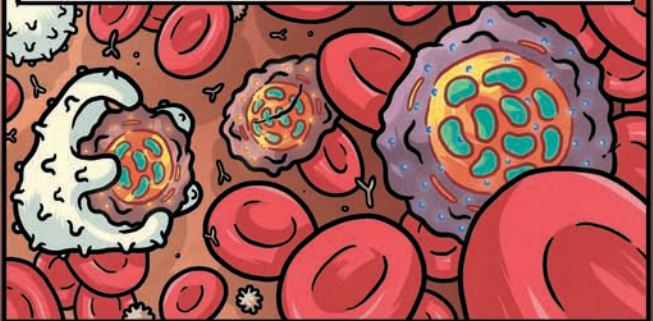
THE IMMUNE SYSTEM STRIKES!
ANTIBODIES AND WHITE BLOOD
CELLS **SWOOP IN** TO DESTROY
THE CELL AND ITS **DEADLY CARGO**.



BUT PLASMODIUM HAS A **STRATEGY** TO ESCAPE. JUST AS **FASHIONS** DIFFER AMONGST PEOPLE, THESE **MARKERS** VARY AMONGST **PARASITES**.



WHILE THE IMMUNE SYSTEM HUNTS DOWN THE CELLS WITH **OLD-FASHIONED MARKERS**, OTHER PLASMODIUM PARASITES SLIP THROUGH THE NET IN **DISGUISES** THE IMMUNE SYSTEM **DOESN'T** RECOGNISE.



AS LONG AS THESE **DISGUISES** KEEP ON CHANGING,
THE IMMUNE SYSTEM IS ALWAYS LEFT **ONE STEP BEHIND**.

A MALARIA VACCINE WOULD TRAIN THE IMMUNE SYSTEM TO RECOGNIZE PLASMODIUM AS SOON AS IT ARRIVES IN THE BODY.



THE PROBLEM IS TRYING TO FIND SOMETHING THAT ALL PLASMODIUM HAVE IN COMMON: A SHARED WEAK SPOT THAT THE IMMUNE SYSTEM CAN RAPIDLY RECOGNISE AND TARGET.



IT COULD DESTROY THE PARASITE BEFORE ANY DAMAGE WAS DONE.

WE KNOW THAT THESE WEAK SPOTS EXIST. PEOPLE LIVING IN AREAS WITH HIGH LEVELS OF MALARIA BECOME MORE RESISTANT AS THEY GET OLDER.



BY STUDYING HOW OUR IMMUNE SYSTEMS RESPOND TO PLASMODIUM, WE ARE LEARNING HOW IMMUNITY TO THE PARASITE DEVELOPS.



THIS WILL HELP US MAKE BETTER, MORE POWERFUL VACCINES.

WHEN IT COMES TO **CONTROLLING** THE MICROSCOPIC PLASMODIUM, IT IS OFTEN **EASIER** TO TARGET THE **MOSQUITOES** THAT CARRY THEM.



MOSQUITOES ARE A **CRITICAL** STAGE IN THE PARASITE'S **LIFECYCLE**.

STOP THE MOSQUITO, STOP THE PARASITE.

DRAINING SWAMPS AND COVERING STANDING WATER WHERE MOSQUITOES BREED, USING INSECTICIDE-TREATED BEDNETS...

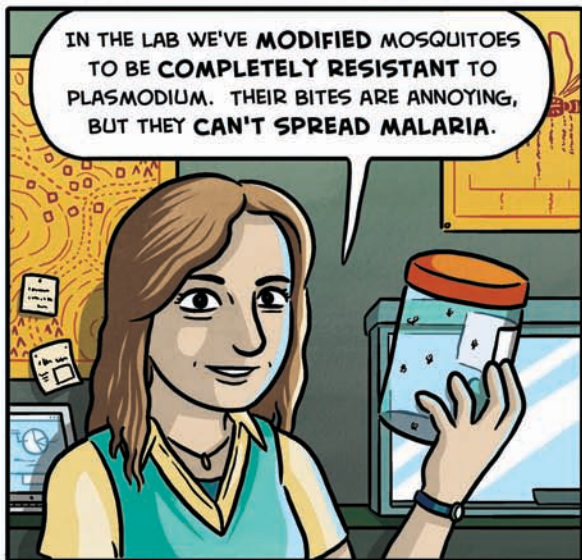


ALL THIS DENIES **PLASMODIUM** THE MOSQUITOES IT NEEDS TO **HITCH A RIDE** INTO OUR BODIES.

WE CAN ALSO OPEN UP NEW **AVENUES** OF ATTACK BY INVESTIGATING THE **COMPLEX RELATIONSHIP** BETWEEN MOSQUITO AND PARASITE.



IN THE LAB WE'VE **MODIFIED** MOSQUITOES TO BE **COMPLETELY RESISTANT** TO **PLASMODIUM**. THEIR BITES ARE ANNOYING, BUT THEY **CAN'T SPREAD MALARIA**.



BY TAKING THE **BATTLE** TO THE MOSQUITO, WE COULD **HALT PLASMODIUM** BEFORE IT GETS UNDER OUR SKIN.

BUT **HUMANS** ARE NOT THE ONLY ORGANISMS TRYING TO **SURVIVE**.



EVERY **PUSH** WE MAKE, THE **PARASITES** **PUSH** BACK.

WE HAVE TO **REMEMBER** THAT THESE **PARASITES** HAVE BEEN **EVOLVING** ALONGSIDE **HUMANS** FOR A LONG TIME.



THEY'VE FIGURED OUT OUR **CELL** **BIOLOGY** AND OUR **IMMUNITY** MUCH BETTER THAN WE HAVE SO FAR.



AND NOW THEY'RE **ADAPTING** TO OUR **DRUGS** AS WELL.

IN THE **1950s**, **MALARIA** **ERADICATION** SEEMED **FEASIBLE**. WE HAD **POWERFUL** TOOLS: THE **POTENT** **ANTI-MALARIAL** **DRUG** **CHLOROQUINE**, AND THE **EFFECTIVE** **INSECTICIDE** **DDT**.



WE WERE **READY** TO **WIPE** **MALARIA** **OUT**, AND IN SOME **REGIONS** WE HAD **ALREADY** **SUCCEEDED**.



UNFORTUNATELY, OUR **POWER** OVER THE **PARASITE** **DIDN'T** **LAST** FOR LONG.

THE **PROBLEM** IS THAT NO MATTER HOW EFFECTIVE A **TREATMENT** IS IN THE LAB, **COMPLICATIONS EMERGE** WHEN THESE TREATMENTS ENTER THE **REAL WORLD**.



GIVEN THE **OPPORTUNITY**, EVEN A **SMALL AMOUNT** OF RESISTANCE IN THE PARASITE POPULATION GIVES PLASMODIUM A **CHANCE TO SURVIVE**.

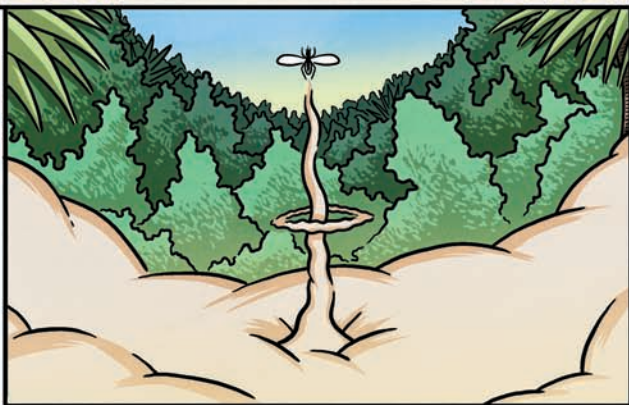


OVER TIME, THIS FIGHT FOR SURVIVAL **AMPLIFIES** THE RESISTANCE AND A **NEW STRAIN** OF RESISTANT PARASITES **EMERGES**.

IF WE'RE NOT **CAREFUL**, OUR PROMISING TREATMENTS **RAPIDLY BECOME USELESS** IN THE FACE OF A **NEWLY RESISTANT STRAIN**.



WE'VE LEARNED THIS THE **HARD WAY**. PLASMODIUM IS NOW ALMOST COMPLETELY **RESISTANT TO CHLOROQUINE**, AND MOSQUITOES INCREASINGLY **IMPERVIOUS TO DDT**.



TO STAND A CHANCE OF GETTING THE **UPPER HAND** IN THE FUTURE, WE NEED TO UNDERSTAND MORE ABOUT HOW **RESISTANCE** DEVELOPS AND SPREADS.



BY LOOKING AT PLASMODIUM'S GENES, WE ARE BEGINNING TO UNDERSTAND HOW IT EVOLVES. ACCESS TO THIS INFORMATION IS BECOMING EASIER AND EASIER.

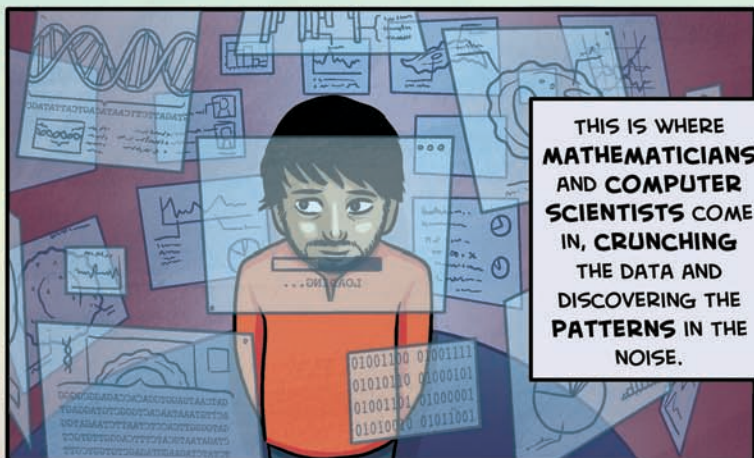


DURING MY PHD I SPENT A WHOLE YEAR SEQUENCING JUST ONE PARASITE GENE.

NOW, WE CAN SEQUENCE ALL OF A PARASITE'S 5300 GENES IN A WEEK. AND WE CAN DO THOUSANDS AT A TIME.



THE DATA IS POURING IN. THE DIFFICULTY IS GETTING MEANINGFUL ANSWERS FROM IT.



THIS IS WHERE MATHEMATICIANS AND COMPUTER SCIENTISTS COME IN, CRUNCHING THE DATA AND DISCOVERING THE PATTERNS IN THE NOISE.

WE LIVE IN A CHANGING WORLD, AND AS ECOSYSTEMS, MEDICINES AND HUMAN SOCIETIES CHANGE, WE SHOULDN'T BE SURPRISED THAT PARASITES CHANGE TOO.



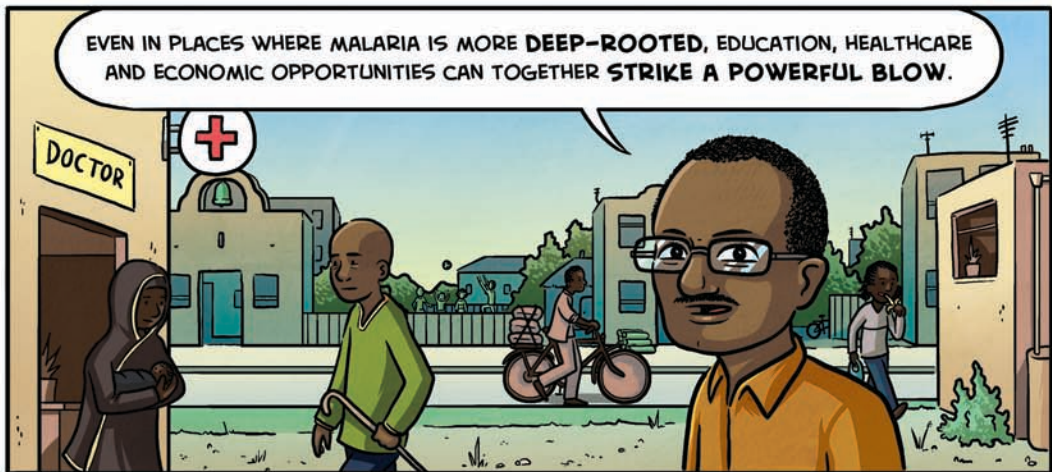
IF WE GATHER THE DATA AND LEARN HOW PARASITES ADAPT, AT LEAST THEN OUR FIGHT WILL BE WITH AN ENEMY WE UNDERSTAND.



MALARIA WAS ELIMINATED FROM EUROPE WITHOUT NEW DRUGS OR VACCINES. THE MAIN FORCE WAS ECONOMIC DEVELOPMENT.

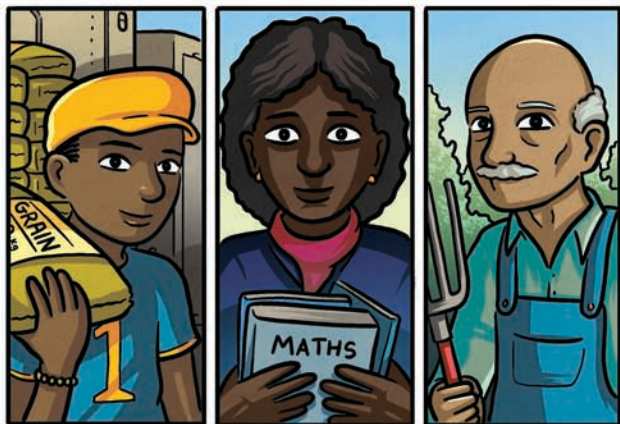


DEFEATING MALARIA IS A CHALLENGE FOR MORE THAN JUST BIOLOGISTS. POLITICIANS, ECONOMISTS AND SOCIAL SCIENTISTS PLAY AN IMPORTANT ROLE TOO.



EVEN IN PLACES WHERE MALARIA IS MORE DEEP-ROOTED, EDUCATION, HEALTHCARE AND ECONOMIC OPPORTUNITIES CAN TOGETHER STRIKE A POWERFUL BLOW.

BUT MALARIA LEAVES THE PEOPLE WHO DRIVE A COMMUNITY'S DEVELOPMENT BEDRIDDEN.



BY REDUCING THE BURDEN OF MALARIA THE VICIOUS CYCLE CAN BE BROKEN.

PLASMODIUM IS A **TERRIBLE FOE**. IT'S AN ARMY OF **BILLIONS**, A GLOBAL THREAT WITH THE ABILITY TO **EVOLVE** RESISTANCE TO OUR WEAPONS.

IF WE WANT TO **DEFEAT IT FOR GOOD**, WE NEED ALL THE HELP WE CAN GET. THAT'S WHY WE ARE TRYING TO **UNDERSTAND MALARIA FROM EVERY ANGLE**:



THE PATIENT THE INFECTED CELLS THE MOSQUITO THE IMMUNE SYSTEM THE PARASITE



AS WE RESEARCH **UNKNOWN ASPECTS** OF THIS DREADFUL DISEASE, WE HOPE WE WILL **REVEAL** NEW WAYS OF **PREVENTING** AND **CURING** IT.

PUTTING A **STOP** TO MALARIA IS A **MAMMOTH** TASK.



THERE ARE NO **EASY ANSWERS** TO THE **PROBLEMS** THAT WE FACE.



BUT THE MORE WE LEARN ABOUT THIS MYSTERIOUS ORGANISM, THE BETTER OUR CHANCES OF SUCCESS.

THE EUROPEAN VIRTUAL INSTITUTE FOR MALARIA RESEARCH IS AN EXAMPLE OF **SCIENTIFIC COLLABORATION** IN ACTION.



THIS NETWORK **CONNECTS** SCIENTISTS ACROSS EUROPE AND BEYOND, WORKING TO EXPAND OUR **KNOWLEDGE** OF MALARIA.



REGULAR **CONFERENCES** BRING TOP THINKERS AND AMBITIOUS YOUNG RESEARCHERS **TOGETHER** IN ONE PLACE, TO DISCUSS **FINDINGS** AND SHARE IDEAS.



MEANWHILE, THE **PROGRAMME** WORKS TO TRAIN THE **NEXT GENERATION** OF MALARIA SCIENTISTS.



STUDENTS COMPLETE THEIR STUDIES ACROSS SEVERAL DIFFERENT LABS, GAINING SKILLS AND CONTACTS THAT WILL LAST A **LIFETIME**.

IT IS EFFORTS LIKE THESE THAT **DRIVE** OUR UNDERSTANDING OF MALARIA **FORWARD** AS A TRULY **GLOBAL, CO-ORDINATED** EFFORT.



AND MAYBE THEN WE CAN BEGIN TO TURN THE TIDE ON THIS **DREADFUL KILLER**.

MALARIA IS ONE OF HUMANKIND'S OLDEST AND DEADLIEST FOES. EVIMALAR IS A MALARIA RESEARCH NETWORK OF EXCELLENCE, FUNDED BY THE EUROPEAN COMMISSION CURRENTLY INVOLVING 62 GROUPS OF SCIENTISTS FROM INSTITUTES IN EUROPE, AFRICA, INDIA AND AUSTRALIA. ITS HEAD OFFICE IS AT THE UNIVERSITY OF GLASGOW IN THE UK. BY WORKING TOGETHER WE HOPE TO BETTER UNDERSTAND THE FUNDAMENTAL BIOLOGY OF THE PARASITE AND HOW THE PARASITE SUCCESSFULLY LIVES IN TWO VERY DIFFERENT ENVIRONMENTS: HUMANS AND MOSQUITOES. WE WILL THEN USE THIS KNOWLEDGE TO GENERATE NEW TOOLS TO FIGHT THE DISEASE.

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MORE FROM THE ARTISTS AT THEIR WEBSITES:

WWW.EDWARDROSS.CO.UK WWW.TOMHUMBERSTONE.COM WWW.LLUKEPEARSON.COM

THANKS TO THE EUROPEAN COMMISSION FP7 NETWORK OF EXCELLENCE PROGRAMME FOR FUNDING THIS PROJECT.

WITH THANKS TO ALL OUR INTERVIEWEES AND COLLABORATORS FROM THE EVIMALAR NETWORK AND THE SCIENTIFIC COMMUNITY. ADDITIONAL GRATITUDE TO MATT BERRIMAN AND SARAH REECE FOR ADVICE AND VISUAL RESOURCES. AND WITH SPECIAL THANKS TO ANDY WATERS, GILLIAN MURRAY AND HANSA PERTAB FOR ALL THEIR HELP.



THE PARASITES MATURE AND MOVE TO THE SALIVARY GLANDS, READY TO BE INJECTED INTO THE NEXT HUMAN THAT IT BITES.



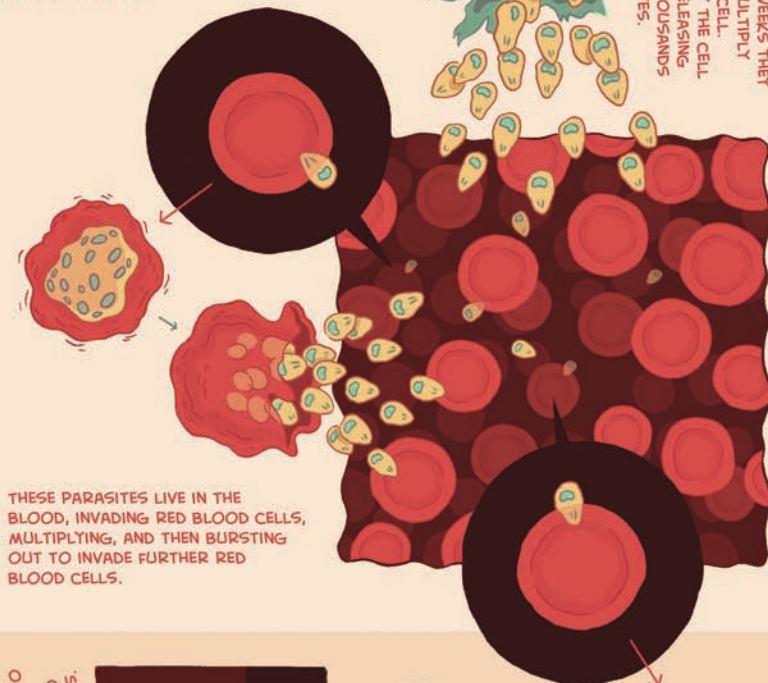
INSIDE THE MOSQUITO, THE PARASITES ESCAPE FROM THE GUT AND DEVELOP. THE MOSQUITO ITSELF IS NOW INFECTED.



WHEN THE MOSQUITO FEEDS, THE PLASMODIUM PARASITES IN ITS SALIVA GET INJECTED INTO THE BODY. THE PARASITES TRAVEL TO THE LIVER AND BURROW INSIDE A LIVER CELL TO HIDE FROM THE IMMUNE SYSTEM.

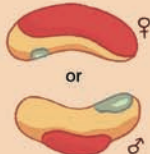
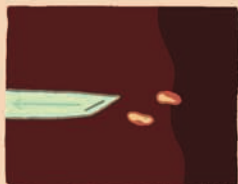


FOR TWO WEEKS THEY SILENTLY MULTIPLY INSIDE THE CELL. EVENTUALLY THE CELL BURSTS, RELEASING TENS OF THOUSANDS OF PARASITES.



THESE PARASITES LIVE IN THE BLOOD, INVADING RED BLOOD CELLS, MULTIPLYING, AND THEN BURSTING OUT TO INVAD FURTHER RED BLOOD CELLS.

WHEN THE MOSQUITO BITES AND DRINKS THE BLOOD, IT ALSO TAKES UP PARASITES.



MALARIA: THE BATTLE AGAINST A MICROSCOPIC KILLER

MALARIA IS A TERRIBLE DISEASE, AND ONE OF HUMAN KIN D'S OLDEST AND DEADLIEST FOES. THIS COMIC EXPLORES OUR ONGOING BATTLE WITH THE PARASITE THAT CAUSES MALARIA, AND GOES INSIDE THE LABS AND CLINICS WHERE SCIENTISTS ARE WORKING TO PUT AN END TO THE MISERY THAT MALARIA CAUSES.

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