STEM Careers

TIME

Metamorphosis of Medicine

Sharon Coan

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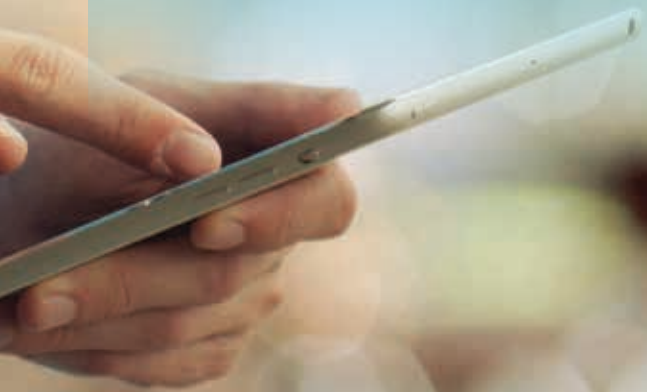


Modern Medical Imaging

A patient has been experiencing pain in the abdomen. The cause is unclear to the doctor, so he orders a digital x-ray. Compared to the original x-rays, digital x-rays produce clearer images and emit less radiation. The x-ray shows something in the area of the gallbladder, but it's still not clear exactly what it is. So, an **ultrasound** is done. Ultrasonic pressure waves echo off the gallbladder. A computer turns the waves into images on a screen. The doctor can now see that the patient has gallstones, but it's hard to tell if they are blocking the bile ducts. To discover this, the doctor orders a **HIDA scan**. This scan will show the liver and gallbladder working in real-time, as opposed to the still images provided by other scans. The doctor is able to see the bile moving from the liver to the gallbladder and into the small intestine, so there is no blockage. With the aid of all this advanced inner-body imaging, the doctor and patient decide on an appropriate treatment.

ultrasound diagnostic machine

Career: Radiologist

Karen Reuss, M.D., is a women's imaging specialist at Newport Diagnostic Center, where she uses imaging to determine whether her patients have cancer or other diseases. In an interview, Dr. Reuss spoke of her work.

Question: What changes have you seen in radiology over the years?

Dr. Reuss: The most change has happened with the radiological equipment we use. Technology research and a strong, competitive market have produced increasingly efficient and accurate imaging machines.

Question: How has this equipment changed your work?

Dr. Reuss: I am excited about the new 3-D Tomosynthesis equipment we have. These machines rotate around the area being examined and take a series of images, which are then synthesized into a 3-D image. They are more efficient and comfortable for the patient than traditional imaging machines. Extremely clear images produced in three dimensions allow the radiologist to make very accurate diagnoses.

DIG DEEPER!

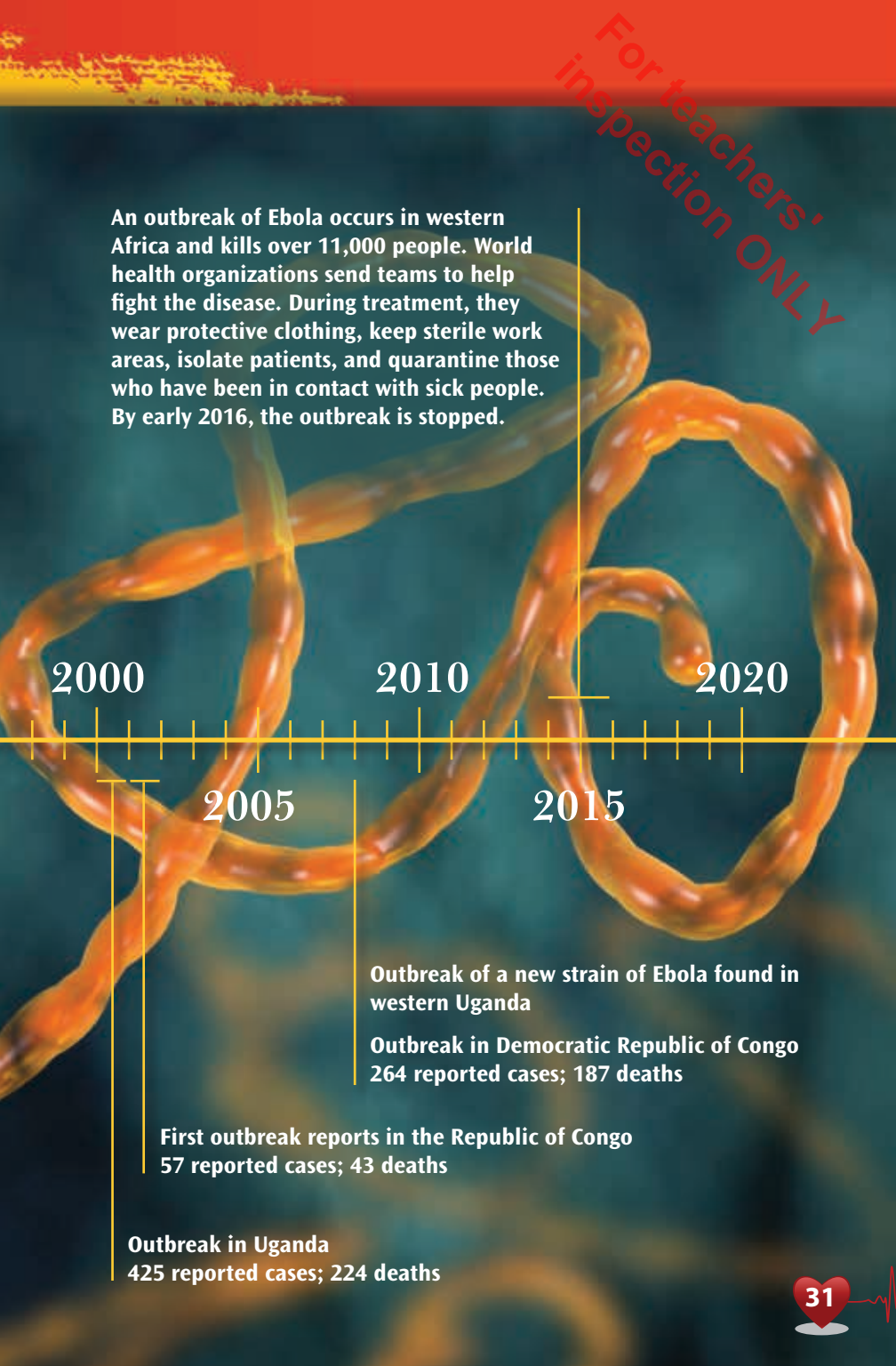
Ebola: Stopping an Epidemic

In 1976, a new virus is ravaging people in Zaire, Africa. Over the next 20 years, it infects people in several African countries. Doctors from around the world work to stop the spread of this deadly virus.

Outbreak in Democratic Republic of Congo
315 reported cases; 250 deaths

1975 1980 1985 1990 1995

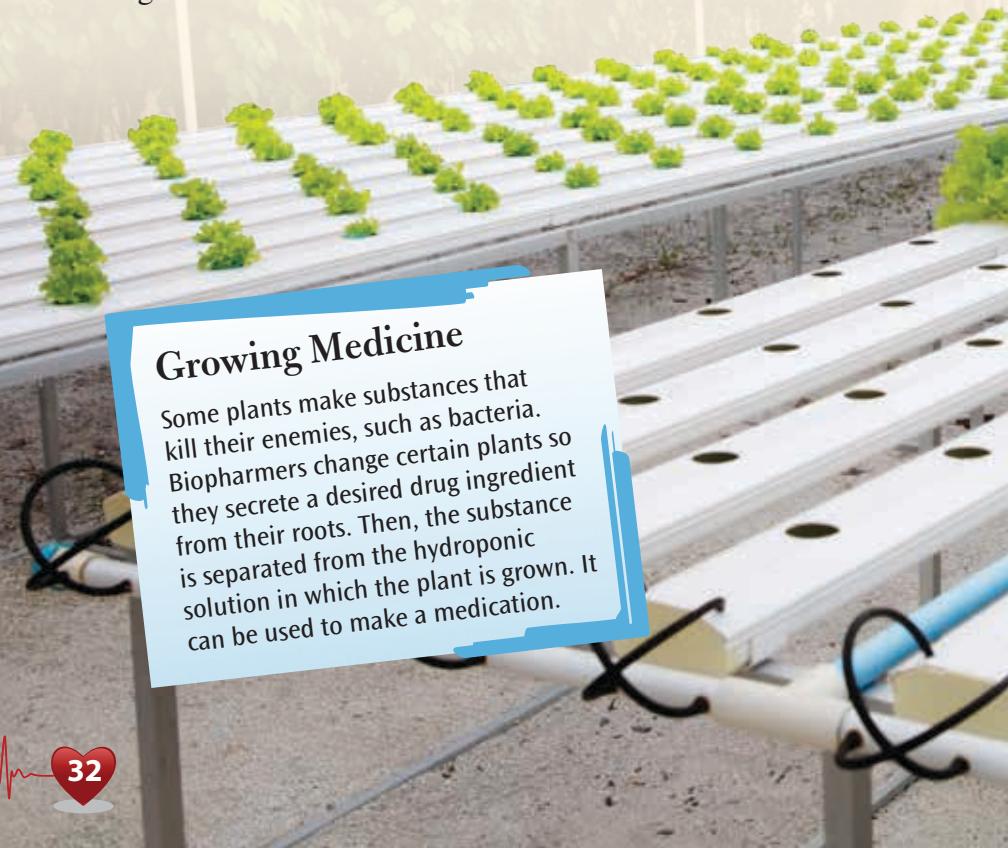
A thermos containing two vials of blood arrives at a lab in Belgium. A note says the blood is from a nun working in Africa. She is one of 318 people who have contracted a mysterious disease and is at risk of dying. Dr. Peter Piot looks at the blood under a microscope and finds a worm-like structure that is huge compared to other microbes. This newfound virus is later named Ebola. Doctor Piot discovers that contact with infected people's body fluids causes the disease to spread.



Prescribing New Health Care

Since the early days of aspirin and antibiotics, more companies have become involved in the manufacturing of prescription drugs. Scientists in the field are always looking for new ways to produce and use them effectively.

When a **biopharmer** goes to work, he does not walk into a field. He enters a room connected to a sealed greenhouse. Before entering the main growing area, he puts on a biohazard suit to avoid contaminating his plants. His **hydroponic** farm uses a special method to collect the proteins produced by the roots of selected or modified plants. These are analyzed for potential uses. The biopharmer checks his tobacco plants, which are currently developing proteins that could be used in a medicine to fight the Ebola virus.

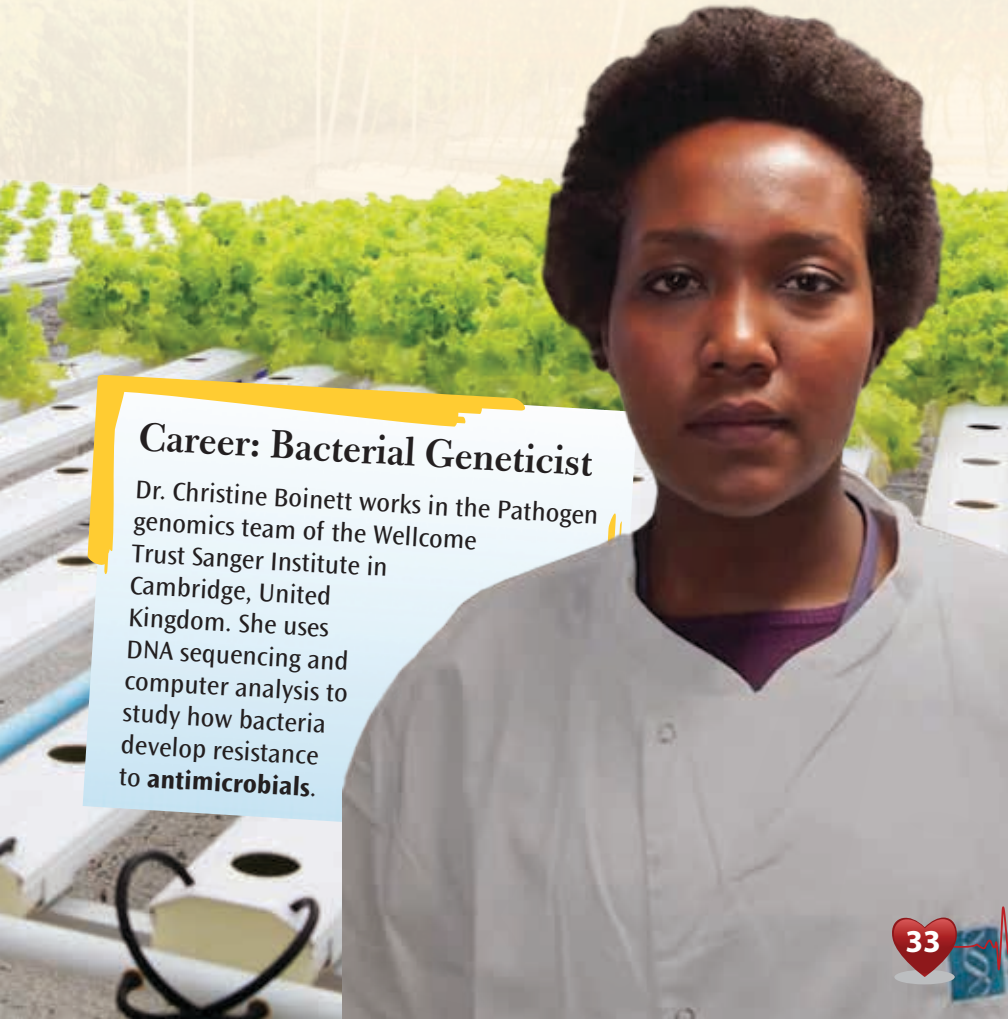


Growing Medicine

Some plants make substances that kill their enemies, such as bacteria. Biopharmers change certain plants so they secrete a desired drug ingredient from their roots. Then, the substance is separated from the hydroponic solution in which the plant is grown. It can be used to make a medication.

Personalized Medications

A woman has suffered a blood clot in her leg. Her doctor knows that she needs a blood-thinning medication. Current research has shown that a person's genetic makeup can influence the specific dosage necessary for blood-thinners to work correctly. So, the doctor uses his computer to access his patient's **genome** chart. It is part of her permanent medical record. Her **genes** show that she will need a higher dosage than most people. The doctor uses this information to guide his treatment of this patient.



Career: Bacterial Geneticist

Dr. Christine Boinett works in the Pathogen genomics team of the Wellcome Trust Sanger Institute in Cambridge, United Kingdom. She uses DNA sequencing and computer analysis to study how bacteria develop resistance to **antimicrobials**.

Reader's Guide

1. Name some specific examples of how the past influences the field of medicine today. Name another field of study where this pattern is true, and provide examples.
2. What are the benefits of a society having an effective health care system for its people?
3. Think about some of the careers in the medical technology industry included in this book. Are there any you would be interested in? If so, what attracts you to them?
4. What ethical standards should be instituted when genetically altering plants, animals, and/or humans?