TEACHER EXHIBITION GUIDE

Disease detectives

Science Museum *of* Minnesota®

This project is made possible by a Science Education Partnership Award (SEPA) award from the National Center for Research Resources, a component of the National Institutes of Health.

Be a Disease Detective

Investigate The Case of the Birthday Surprise, The Case of the Unwelcome Visitor and The Case of the World Traveler Blues for a look at infectious disease.

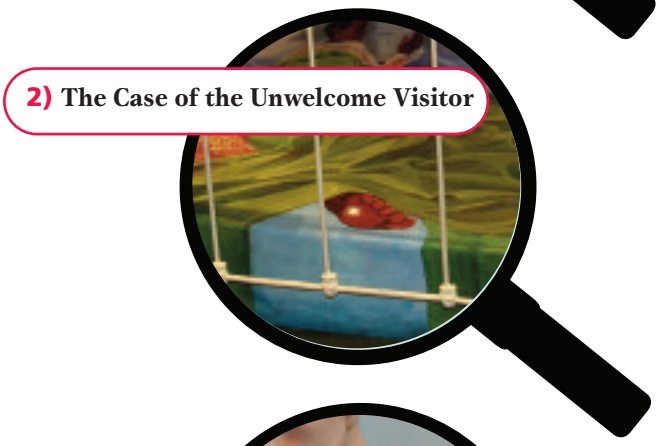
The Big Ideas

+ Infectious diseases are spread in different ways.
+ There are things we can do to stop the spread of infectious diseases.
+ There are different kinds of microbes that cause disease.
+ Investigating infectious diseases requires many people working together.

When you visit the *Disease Detectives* exhibition:

+ Share expectations, plans and schedules for the visit with students and chaperones. Give chaperones copies of any materials given to students.
+ Do some preparation activities before your visit. Use suggestions in this guide and the resource list for more ideas.
+ Divide your class into small groups to work together in the exhibition.
+ Review the AT THE MUSEUM Student Pages templates (pp. 14–19) for connections to your curriculum. Choose the activities that meet your needs best. Add your own page(s). Use journals or composition notebooks if you use these in classroom work. Bring sturdy cardboard to write on if you plan to use single pages. Go over all pages with students before your field trip to share your expectations, clarify questions, and reinforce vocabulary. The grade-level recommendations are suggestions; use your own judgment about the appropriate materials for your own students.
+ There are many starting points in the exhibition. If there is crowding in one section, encourage students to go to another section.
+ Ask students to add their own questions and observations that arise during their exhibit explorations.

This guide contains:



Exhibition Overview

Investigate infectious disease mysteries by gathering data about 3 cases of infection. *The Disease Detectives* exhibition invites you and your students to investigate several scenarios of infectious disease grouped by the method of disease transmission:

+ Through food and water
+ Through the air and droplets
+ By means of a vector, e.g. mosquito or tick

Analyze lab data, learn about potential infectious agents and the transmission of infectious disease to propose a likely culprit for each scenario.

1) The Case of the Birthday Surprise

+ Many diseases can be spread through food and water
+ There are things that you can do like proper food handling and good hygiene to prevent the spread of infectious disease

On Adam's birthday, he has become sick. In the "clinic", you can interact with Adam (a mannequin) to take his temperature, determine his heart rate and listen to his bowels. Next to the clinic, lab tests identify the type of pathogen and compare it with other samples.

Learn more about pathogens that are transmitted through food and water, like *E.coli, Giardia, Salmonella,* the cholera pathogen, and *Norovirus*. Learn how safe food-handling practices, handwashing, and cooking guidelines can protect against the spread of infectious disease.

Role-play an epidemiologist by comparing data to solve the mystery of the illness' source.

2) The Case of the Unwelcome Visitor

+ Infectious Diseases can be spread by vectors (ticks, mosquitoes, fleas and other "bugs")
+ Using insect repellent, proper clothing and other protective measures can prevent the spread of these diseases

Yolanda has become ill while visiting family in West Africa. In the "clinic", you can take Yolanda's temperature and listen to her heart rate. The lab area has samples of Yolanda's "blood" that can be compared to other samples in order to identify the pathogen.

Learn more about other vector-borne diseases, such as Lyme disease, malaria, West Nile virus, and plague, as well as the vectors that spread the disease from one creature to another.

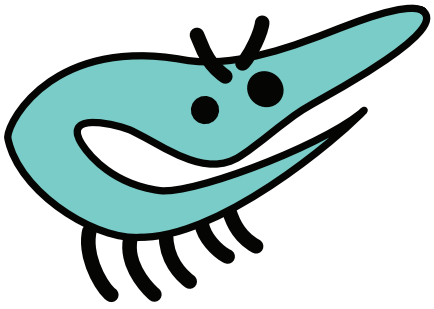
Identify which vector and which pathogen may have caused Yolanda's illness.

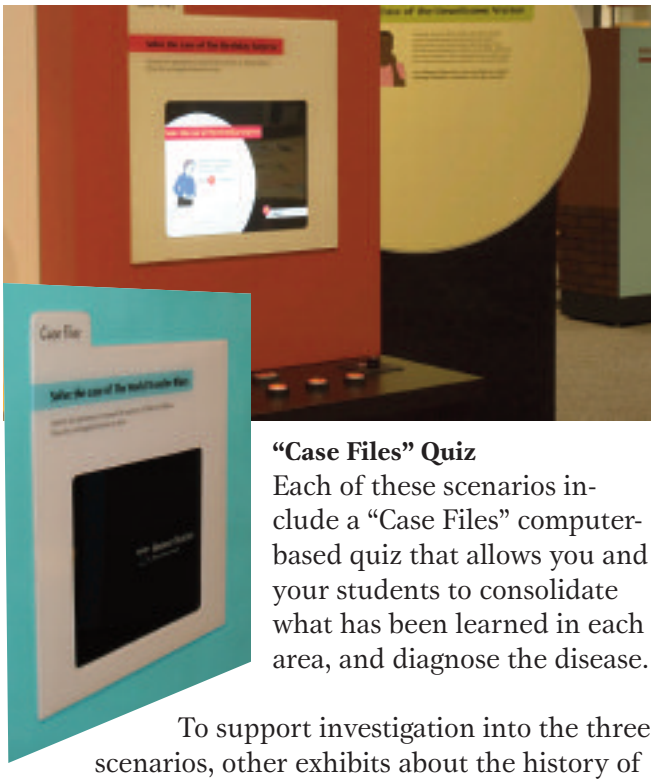
3) The Case of the World Traveler Blues

+ **Infectious disease can be spread through the air and from droplets landing on surfaces**
+ **Following proper hygiene recommendations and treatment can prevent spread of infectious diseases**

Marcus has just returned from a business trip to Southeast Asia and has symptoms of a respiratory disease. Take his temperature, listen to his heart and lungs in the "emergency room" and take a nasal swab to help identify which pathogen may be at fault.

One of the most well known air and droplet-borne diseases is influenza, which can be very deadly. Investigate how to choose a vaccine for this year's virus, take a quiz about flu facts and misconceptions and learn more about preventing transmission through sneezing and coughing.





"Case Files" Quiz
Each of these scenarios include a "Case Files" computer-based quiz that allows you and your students to consolidate what has been learned in each area, and diagnose the disease.

To support investigation into the three scenarios, other exhibits about the history of infectious diseases, types of microbes and why our bodies are not sick all of the time, add depth to your investigation.

Timeline
Infectious diseases and what we know about infectious diseases is constantly changing.

Microbe Dance
There are different types of microbes that cause disease. Prevention and treatment for infectious diseases are determined by the type of microbe at work.

Body Defenses
Even though there are microbes everywhere, we are not sick most of the time. Human bodies have a variety of ways of combating microbes.
http://www.diseasedetectives.org/body_defense

See images of exhibition components and try out a few of the interactive exhibits:
http://www.diseasedetectives.org/tour

ABOUT THIS TOPIC

The Basics of Infectious Disease

An infectious disease results from the presence of pathogenic microbial agents, including viruses, bacteria, parasites, and unusual proteins known as prions. Once inside the body, these germs damage tissues while using energy from cells to reproduce and spread.

How Infectious Diseases Spread

The characteristics of the infectious agent will determine how the disease spreads from one person to another. There are various pathways of infectious disease transmission including physical contact with infected individuals, through water, food, contaminated objects, airborne inhalation, or by means of a vector. A vector is an arthropod (insect or tick) that transmits a pathogenic (infectious) microbe to humans or animals, generally through a bite.

In each of these transmission modes, the disease can be triggered by bacteria, viruses, or protozoa. For example, diseases that spread through food or water contamination can be a:

Bacteria
http://www.diseasedetectives.org/stories/salmonella

Virus
http://www.diseasedetectives.org/stories/polio

Parasitic protozoa
http://www.diseasedetectives.org/stories/giardia

+ For activities that help students in grades 4–8 learn more about beneficial bacteria, go to http://www.smm.org/mathpacks/cells/before/bacteria.php

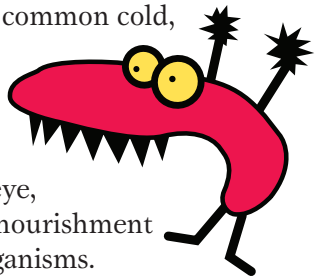
+ For basic information about disease and microbes, a free on-line copy of *Understanding Microbes in Sickness and in Health,* a 51-page booklet, is available from the National Institutes of Health. http://www3.niaid.nih.gov/healthscience/healthtopics/microbes/PDF/microbesbook.pdf

What kinds of germs (microbes) cause infectious disease?

Bacteria are single-celled organisms without a nucleus (and not all single-celled organisms are bacteria). Most bacteria do not cause disease in humans. In fact, bacterial action is needed to produce or modify many foods.

Strep throat, TB, pneumonia, and some of the gastrointestinal diseases ("food poisoning") like *Salmonella* or *E. coli* contamination are examples of disease caused by bacteria.

Viruses are tiny bundles of genetic material (DNA or RNA) within a protein coat that are not cells, or living organisms. They infect the cells of a host and use the host cells to replicate themselves, and disrupt the working of the host cells. Examples of virus-caused diseases are chickenpox, the common cold, and influenza.



Ranging in size from tiny, single-celled organisms (usually with nuclei) to worms visible to the naked eye, **parasites** are organisms that derive nourishment and protection from other living organisms. Examples of diseases caused by parasites are malaria, giardiasis, and Chagas disease.

Prion—what is it? A group of diseases that affect nervous system tissue are believed to be caused by an agent that causes strange folded proteins in its victims. Prions were only recently described in the 1980s and still poorly understood. Prions are believed to cause diseases like Bovine Spongiform Encephalopathy (BSE or "mad cow" disease) and Creutzfeldt-Jakob disease.

Connecting with the Classroom

BEFORE YOUR VISIT

+ What kinds of "germs" cause infectious disease? Discuss some of the ones that students have heard of or that have been in the news.

+ Use http://www.diseasedetectives.org/microbe_gallery for a quick introduction to more common disease microbes, especially the ones you will see during your visit to *Disease Detectives.*

Disease Detectives—What do they do?
What do they investigate? Compare police detectives and "disease detectives".

Police Detective work	**Meet some scientists who do Disease Detective work**
Investigate crimes	Investigate diseases Onalee Grady-Erickson http://www.diseasedetectives.org/detectives/gradyerikson
Look for clues at a crime scene	Look for clues in the community Vivek Raman http://www.diseasedetectives.org/detectives/raman
Judge quality of evidence	Judge quality of evidence Dave Boxrud http://www.diseasedetectives.org/detectives/boxrud
Form hypotheses	Form hypotheses Most scientists form hypotheses
Identify suspects	Identify suspected causes Melissa Kemperman http://www.diseasedetectives.org/detectives/kemperman Fe Leano http://www.diseasedetectives.org/detectives/leano
Present evidence in court	Present evidence to the state health department, in scientific journals and meetings Most scientists gather and present evidence

Adapted from: *Detectives in the Classroom* http://www.montclair.edu/Detectives/index.html

+ Review the exhibition with students: http://www.diseasedetectives.org/tour

BEFORE YOUR VISIT, continued

Grades Kindergarten–4

Disease is part of everyone's life and all ages will be able to gain from their experiences in *Disease Detectives.* Younger students (K–4) will enjoy the opportunity to use medical tools, such as thermometers and stethoscopes to gather evidence about the illnesses in each scenario. They can also learn more about the ways infectious diseases are spread, to be able to discuss healthy habits that will help them avoid becoming ill.

+ Assess your students' knowledge of infectious disease, and introduce the exhibition. Discuss:

—How do people get sick? Clarify the difference between infectious disease and non-infectious disease, such as those caused by nutritional deficiencies or other environmental factors or genetic abnormalities.
—How do people know if they are sick? What are some symptoms?
—What are some ways to keep from getting sick?

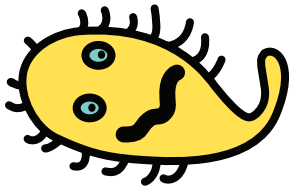
+ Hand washing

Proper hand washing is an important factor in disease prevention and blocking the transmission of many diseases. Discuss when and why we should wash our hands. Ask students to describe or write and illustrate a good hand washing procedure. Ask students to find the hand washing activity in the exhibition to see if their procedure matches the *Disease Detectives* procedure. Use one of the hand washing activities listed in the Teacher Resource page (pg. 12) to reinforce the exhibition message.

Grades 5–8, 9–12

+ Be a disease detective (Museum activity *Disease Detectives* Data Log pg. 15–17)

Prepare your students to recognize important symptoms of infectious disease and consider how to gather more data at the exhibition. Read the following and discuss:
—A patient comes to the clinic with complaints of feeling hot and achy, with no appetite and nausea.
—He has had a headache for several days and now has a rash on his leg.
—If you were on the clinic staff, what would you do? What clues and information would you need? If several people seem to have the same symptoms, how would you connect their illnesses?
—Ask student to respond to these questions in writing as well. After the museum visit, ask students to review their answers—how would they change their answers?
—Invite students to be Disease Detectives at the museum.
—Review the Disease Detectives Data Log that they will use to gather information.
—Assign each student or groups of students to one of the three disease scenarios. Their responsibility will be to gather data about the patient, the evidence that links the disease symptoms with one infectious agent and decide which agent has caused the disease. After you return to the classroom, have each group review their data and diagnosis, then jigsaw the students into groups of 3, making sure that there is one student who is knowledgeable about each case, to review a new "mystery case" (pg. 11). They will use their combined expertise to look at new data and decide on a diagnosis for the new patient. They can vote their choice on the exhibition website.
www.diseasedetectives.org/diagnosis



Grades 5–8 and 9–12

+ Disease Close-up (Museum activity pg. 18)

—Disease in the news: Make a classroom chart of current news stories about disease. Which are infectious and which are not? Where and how do infectious diseases begin?

—This museum activity asks students to become familiar with one particular infectious disease, glimpse its history and learn more about its significance today.

—Students will choose one of the diseases from the timeline. This can be done before your visit, using the Disease Detectives website http://www.diseasedetectives.org/timeline or students can choose at the exhibition during the museum visit.

Grades 9–12

Review questions to investigate at the exhibition (**Disease Detectives: Transmission and Technology,** pg. 19) Clarify expectations and review the vocabulary. Technology in this case includes any human-developed method to solve the problems of disease detection, diagnosis, treatment or prevention. One easy example for each scenario is that a thermometer is used to help in detection and diagnosis. Each scenario has several examples that are unique to the situation, but also some that are universal.

Classroom role-play: Epidemiology

As students enter the classroom, hand an index card to each person who is wearing jewelry (watch, earrings, necklace, ring, etc.). Do not tell students why they are getting the card, but explain that the class will take a look at what disease detectives do.

When the class is complete, ask students with the cards to stand up. Explain that these students have a "fake" disease. What is the pattern? Can students find what is similar about all the students, that the students who are sitting and without cards do not have?

Once students have discovered the link, explain that this is the first step. Now they will generate a hypothesis about why the jewelry may be an indicator of this "fake" disease. List all possible hypotheses. Ask students to decide what might be the next steps. Generate some ideas of how to test any or all of the hypotheses.
(Adapted from Detectives in the Classroom, *see resource list on pg. 12)*

For another epidemiology activity in which students "infect" each other with a mixture of water and sodium hydroxide, then work through data to determine the source of the original infection, check this activity:
http://www.pbs.org/wgbh/aso/resources/guide/medact4index.html

Epidemiologists use patterns in disease outbreaks to determine the cause of infectious disease. In the Case of the Birthday Surprise in *Disease Detectives*, students analyze evidence that becomes a pattern when combined with other information about people who have become ill with the same symptoms. Epidemiologists can also specialize in a particular type of disease, e.g. vector-borne, like Melissa Kemperman.
http://www.diseasedetectives.org/detectives/kemperman

AFTER YOUR FIELD TRIP

Grades K–4

Discuss: What caused the illness for Adam, Yolanda or Marcus?
http://www.diseasedetectives.org/tour

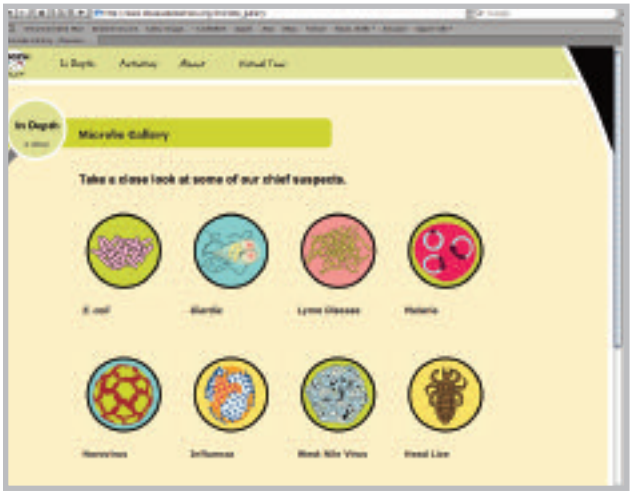
What are some ways you saw at the museum to protect yourself from getting sick?
—hand washing
—sneezing in your sleeve!
—wearing long pants or insect repellent when you are in the woods, camping or parks.

If possible, show students some of the *Disease Detectives* webpages to review what they saw at the museum. Let students explain what they learned.

—Most germs can't be seen without a microscope, but large models help us know what they look like:
http://www.diseasedetectives.org/microbe_gallery

—Our bodies have defenses against illness:
http://www.diseasedetectives.org/body_defense

—People who work on fighting diseases:
http://www.diseasedetectives.org/detectives



Grades 5–8, 9–12

+ Be a disease detective (*Disease Detectives* Data Log Museum activity pg. 15–17)

Have each student compare and review their data and diagnosis with other students who worked on the same scenario, then jigsaw the students into groups of 3, including one student from each scenario, to review a new "mystery case", The Case of the Sick Scientist. (pg. 11) They will use their combined expertise to look at new data and decide on a diagnosis for the new patient. They can vote their choice on the exhibition website.
www.diseasedetectives.org/diagnosis

+ Disease Close-up (Museum activity pg. 18)
Follow-up—research how the disease the student chose is being treated today (cholera, smallpox, plague, HIV/AIDS, tuberculosis). Write a recommendation for your community regarding this disease, include prevention and treatment strategies.

+ Use *Disease Detectives* on-line activities after your visit to reinforce ideas and concepts
http://www.diseasedetectives.org/online_activities
and http://www.diseasedetectives.org/tour

Career Investigation
Ask students to choose one of the Disease Detectives who might have worked on *their* case (Adam, Yolanda, or Marcus) and investigate their job and job preparation needs.
http://www.diseasedetectives.org/detectives

For example, Ben Ho has been researching a malaria vaccine:
http://www.diseasedetectives.org/detectives/ho
and
http://www.smm.org/buzz/museum/ask/ho/questions#answers

Grades 9–12

+ Disease Detectives: Transmission and Technology

Review student answers.

—The "unwelcome visitor" is a mosquito—this area addresses vector-borne diseases, and Yolanda has malaria.

—Marcus, the "world traveler", has contracted influenza, a disease spread through the air, by means of sneezed or coughed droplets.

—The "birthday surprise" was Adam's disease caused by *E. coli*, an example of a pathogen spread through contaminated food or water.

Some of the technologies students would find in the exhibition that are used for detection, diagnosis, treatment, or prevention are: thermometer, stethoscope, microscope, vaccine

—malaria: rapid diagnostic test, insect repellent, bed net

—flu: thermal cycler

—*E.coli:* agar plate and process of growing a sample, soap!

Discuss the impact emerging (e.g., HIV/AIDS) or re-emerging (e.g., tuberculosis) diseases have in regard to environment, society, economics, or individual lifestyle. Ask students to make a graphic organizer, about the how disease impacts the environment, society, lifestyle or economics or how those impact the spread of the disease.

+ "It can't happen to me!"

Sometimes, it seems that infectious disease outbreaks happen in other countries. What are some recent disease outbreaks in our communities, and what precautions can students take in daily life? Research one of the following diseases or pathogens: type of pathogen, how it is transmitted, recent occurrence, prevention, and questions you have about the disease.

—MRSA and sports: Methicillin-Resistant (or multiple-resistant) *Staphylococcus aureus*

—Norovirus

—Mono

—*E.coli*

+ Investigate and take an advocacy position in an infectious disease issue:

Students can write an advocacy position in many formats: e.g. letter to the editor, essays. They can also post their comments on the *Science Buzz* blog http://www.smm.org/buzz/buzz_tags/infectious_disease

—Minnesota Law requires all children enrolling in a licensed day care home or child care facility to show evidence of immunization or properly document exemptions. Should all children have vaccinations? Are there any side effects? What happens if a child is not vaccinated?

—Are Americans too worried about germs? "My grandmother use to say the you have to eat a pound of dirt before you die." Is this true? What are the consequences if we do not wash all food, cans, and bottles before we consume the food?

—Should Americans be allowed to travel to areas where infectious disease is prevalent?

—Should we genetically engineer insects (e.g. mosquitoes) so they do not carry microbes that cause human diseases? (e.g. malaria)

Be a Disease Detective

The Case of the Sick Scientist

Part 1

Compare and review your data and diagnosis with other students who worked on the same scenario (Adam, Yolanda, or Marcus). Discuss the following questions in your group. Look at your **Data Log** to compare and review your answers.

1. What pathogen did you think caused the symptoms the patient had? Do you all agree?
2. What exhibits helped you decide which one it was?
3. What was the most important evidence that led you to the pathogen?

Part 2

Your teacher will assign you to a group with students who solved the other cases.
You will use your combined expertise to look at new data and decide on a diagnosis for the new patient.
You will then vote your choice on the exhibition website. www.diseasedetectives.org/diagnosis

New Case Scenario

The Case of the Sick Scientist

Lina is a scientist who studies bird behavior in tropical areas. She has arrived for the grand opening of a new exhibition about tropical rain forests at the local science museum.

Email

snip/
Hi Mom!

Just got into town yesterday and went to the evening reception for the exhibit opening. They had a great pizza buffet and even an ice cream sundae (my favorite!) bar, but yuk! I had no appetite! And over the last few weeks in Asia I was just eating my trail mix and finding some forest foods (good thing I was traveling with the international wild foods experts!). You would think I would be ready for pizza and ice cream.

Still not feeling well, so I'm going to call the doctor after I finish this email.

Love to everybody back home!
Lina
/Snip

Phone message (voice mail transcription) for clinic appointment:

>>Hello (cough, cough) I need to come in as soon as possible, I am feeling ill—very tired and feverish. I just got off the flight from Kuala Lumpur and feeling very stiff, with back and leg pains. But, I don't think it is from the long flight. Please call me back –
(Cough, cough)<<

Data – Lina's clinic visit

Temp of 102°F.
Blood pressure is normal
Patient reports feeling chills, but no excessive sweats
Reports headache and body aches, some nausea

Discuss:

Diagnosis: vote for one
—Malaria
—*E.coli* food/water contamination
—Influenza

What are important symptoms for your diagnosis?

What other information would you need to help you verify your diagnosis? (for example, other clinic data, more information about Lina's past few weeks, etc.)

Teacher Resources

MICROBES

Understanding Microbes in Sickness and in Health
51-page on-line booklet from the National Institutes of Health. Adults and older students.
http://www3.niaid.nih.gov/healthscience/healthtopics/microbes/PDF/microbesbook.pdf

The Bad Bug Book
Food and Drug Administration guide to food borne pathogenic microorganisms, with descriptions of more than 30 microbes. Adults and older students.
http://vm.cfsan.fda.gov/~mow/intro.html

What is a Germ?
Categories of pathogens, with some prevention tips.
http://kidshealth.org/kid/talk/qa/germs.html
For younger students, grades 3-6, younger with adult help

Microbe World
An excellent website that thoroughly covers types of microbes, tools that scientists use to study them, impact of microbes on human life, and much more.
http://www.microbeworld.org/
Images of microbes
http://www.microbeworld.org/resources/gallery.aspx

EPIDEMIOLOGY

Excellence in Curriculum Innovation through Teaching Epidemiology and the Science of Public Health—EXCITE
Very thorough collection of teaching and reference materials from the Centers for Disease Control and Prevention (CDC) for elementary and secondary students and teachers about public health professionals and the work they do.
http://www.cdc.gov/excite/

Detectives in the Classroom
Middle- and high school epidemiology classroom curriculum for science, mathematics and health educators.
http://www.montclair.edu/detectives/index.html

Emerging And Re-Emerging Infectious Disease
Major concepts related to the changing nature of infectious diseases, and impact on society. National Institute of Health, for grades 9-12
http://science-education.nih.gov/customers.nsf/HSDiseases.htm

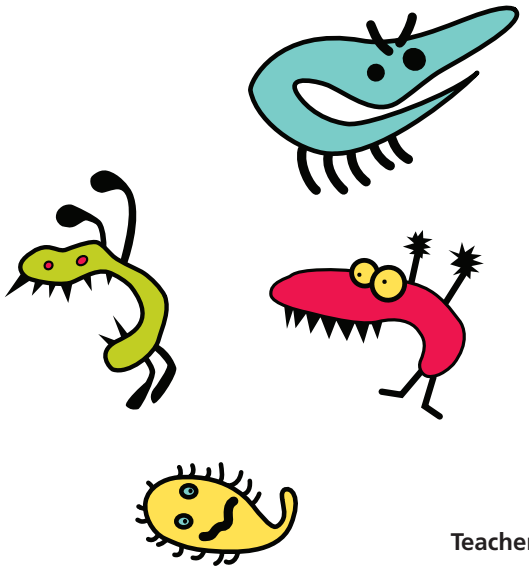
Check the ***Disease Detectives*** website for other links
http://www.diseasedetectives.org/links

HAND WASHING

There are many lessons about the importance of hand washing effectiveness in disease prevention. Here are a few:
For younger students:
http://www.fns.usda.gov/TN/Resources/Nibbles/abc.pdf
For all ages:
http://www.lsuagcenter.com/en/food_health/education_resources/eatsmart/lessons/EatSmart+Lesson+25++Handwashing.htm

School Network For Absenteeism Prevention—SNAP
School-wide project for emphasizing importance of hygiene, especially hand washing, in disease control. For middle school.
http://www.itsasnap.org/

Commercial products for hand washing activities
http://www.glogerm.com/
http://www.brevis.com/cgi-bin/catalog.cgi



Disease Detectives and Standards

The *Disease Detectives* exhibition and Teacher Guide are most closely aligned with the following content standards.

BENCHMARKS FOR SCIENTIFIC LITERACY

From The American Association for the Advancement of Science
Disease Detectives exhibition and activities align with the following sections:

The Nature of Science

Scientific Worldview	Gr. 6-8
Scientific Inquiry	Gr. K-2, 3-5, 6-8, 9-12
Scientific Enterprise	Gr. K-2, 3-5. 6-8, 9-12

The Nature of Technology

Technology and Science	Gr. K-2, 3-5, 6-8
Issues in Technology	Gr. 3-5, 6-8, 9-12

The Human Organism

Basic Functions	Gr. 3-5, 6-8, 9-12
Physical Health	Gr. K-2, 3-5, 6-8, 9-12

For more specific guidelines per grade level, view the website
http://www.project2061.org/tools/benchol/bolframe.htm

NATIONAL SCIENCE EDUCATION STANDARDS

Science as Inquiry
K-4
Use Data To Construct A Reasonable Explanation
5-8
Develop Descriptions, Explanations, Predictions, And Models Using Evidence
Think Critically And Logically To Make The Relationships Between Evidence And Explanations.
9-12
Communicate And Defend A Scientific Argument

Life Science
5-8
Structure and Function in Living Systems

Science in Personal and Social Perspectives
K-4
Personal Health
5-8
Risks and Benefits
9-12
Personal and Community Health

History and Nature of Science
K-4, 5-8, 9-12
Science as a Human Endeavor
9-12
Nature of Scientific Knowledge

For more specific guidelines per grade band, view
http://books.nap.edu/openbook.php?record_id=4962&page=103

NATIONAL HEALTH EDUCATION STANDARDS

Health Education Standard 1—Students will comprehend concepts related to health promotion and disease prevention to enhance health.
3-5
1.5.3. Describe ways in which a safe and healthy school and community environment can promote personal health.
1.5.1. Describe the relationship between healthy behaviors and personal health.
6-8
1.8.1. Analyze the relationship between healthy behaviors and personal health.
1.8.3. Analyze how the environment affects personal health.
9-12
1.12.1. Predict how healthy behaviors can affect health status.
1.12.3. Analyze how environment and personal health are interrelated.

Health Education Standard 8—Students will demonstrate the ability to advocate for personal, family and community health.
9-12
8.12.3. Work cooperatively as an advocate for improving personal, family and community health

For more specific guidelines per grade band, view
http://www.aahperd.org/aahe/pdf_files/standards.pdf

Chaperone Guide K–4

TRIP TIPS

+ There are 3 "cases": Adam, Marcus, and Yolanda are all sick. How did they get sick?

Each case has a mannequin in the "clinic" or "emergency room". Encourage students to examine the patients. The directions are on a 3-sided revolving post next to each patient.

+ The exhibits next to each mannequin help solve the mystery of what is making each one sick.

+ Don't worry about finishing everything on this page.

Encouraging students to look at exhibits, think about, and talk about what they are seeing is most important!

Giant models of pathogens help students visualize "germs".

Solve some disease mysteries!

Ask pairs of kids to find information to help them figure out one or more of the disease mysteries. Talk about their discoveries in your small group.

Our bodies have many ways of fighting disease. See the skateboarder—point out and read a few of the defenses together.

Healthy habits

In each disease mystery, there are lessons about avoiding disease. What are some things we can all do to keep ourselves and our families healthy? Ask students to find ways to keep ourselves healthy by avoiding germs.

For example:
In the Adam area: wash hands thoroughly and often, make sure food is properly prepared (well-done burgers!), clean water supply (don't drink out of a lake or stream directly)

In the Marcus area: wash hands thoroughly and often, sneeze and cough into your sleeve!

In the Yolanda area: cover up bare skin and use repellents in insect-areas

Real Disease Detectives

There are real "disease detectives" shown in the magnifying glass frames. What are their names and what are their jobs?

Data Log

+ **Role-play a disease detective and solve a disease mystery. Gather evidence to find the cause of an infectious disease in your "patient".**
+ **The patient is in a clinic area of the exhibition. This is where you get information from and about the patient.**
+ **The lab and field investigation give more information about your patient's symptoms, results of tests, and includes possible choices for the infectious agent. Check for clues in the "field"—diner, home, or street scene for further information.**

1) The Case of the Birthday Surprise

Clinic

Patient name_____

Temperature _____

Heart rate _____

Other symptoms/important information _____

_____

_____

_____

Lab and Field Investigation

You should also "run some tests" in the Lab area. Check which tests were used and report the result.

☐ Agar plate test ☐ DNA match ☐ Blood test sample ☐ Nasal swab ☐ Foods consumed chart

Results of Labwork _____

_____

_____

_____

Suspected pathogen (circle the likely infectious agent)

Giardia lamblia Norovirus *E. coli* O157:H7

Evidence that supports your choice_____

_____

_____

_____

Information about this pathogen (check the Microbe Dance and Lab areas)

_____

_____

_____

Check your diagnosis and find treatment suggestions in the **Case Files** computerized module.

Data Log

+ **Role-play a disease detective and solve a disease mystery. Gather evidence to find the cause of an infectious disease in your "patient".**
+ **The patient is in a clinic area of the exhibition. This is where you get information from and about the patient.**
+ **The lab and field investigation give more information about your patient's symptoms, results of tests, and includes possible choices for the infectious agent. Check for clues in the "field"—diner, home, or street scene for further information.**

2) The Case of the Unwelcome Visitor

Clinic

Patient name_____

Temperature _____

Heart rate _____

Other symptoms/important information _____

_____

_____

_____

Lab and Field Investigation

You should also "run some tests" in the Lab area. Check which tests were used and report the result.

☐ Agar plate test ☐ DNA match ☐ Blood test sample ☐ Nasal swab ☐ Foods consumed chart

Results of Labwork _____

_____

_____

_____

Suspected pathogen (circle the likely infectious agent)

West Nile virus *Borrelia burgdorferi* (Lyme disease bacteria) *Plasmodium* (malaria parasite)

Evidence that supports your choice. _____

_____

_____

_____

Information about this pathogen (check the Microbe Dance and Lab areas)

_____

_____

_____

Check your diagnosis and find treatment suggestions in the **Case Files** computerized module.

Data Log

+ **Role-play a disease detective and solve a disease mystery. Gather evidence to find the cause of an infectious disease in your "patient".**
+ **The patient is in a clinic area of the exhibition. This is where you get information from and about the patient.**
+ **The lab and field investigation give more information about your patient's symptoms, results of tests, and includes possible choices for the infectious agent. Check for clues in the "field"—diner, home, or street scene for further information.**

3) The Case of the World Traveler Blues

Emergency Room (clinic)

Patient name_____

Temperature _____

Heart rate _____

Other symptoms/important information _____

_____

_____

_____

Lab and Field Investigation

You should also "run some tests" in the Lab area. Check which tests were used and report the result.

☐ Agar plate test ☐ DNA match ☐ Blood test sample ☐ Nasal swab ☐ Foods consumed chart

Results of Labwork _____

_____

_____

_____

Suspected pathogen (circle the likely infectious agent)

Flu virus *Mycobacterium tuberculosis* head lice

Evidence that supports your choice. _____

_____

_____

_____

Information about this pathogen (check the Microbe Dance and Lab areas)

_____

_____

_____

Check your diagnosis and find treatment suggestions in the **Case Files** computerized module.

Disease Close-Up

Choose one of the diseases from the timeline (at right).

Name of disease

Bacterial or Viral (circle one)

First known incidence of this disease

Status today

Infectious Disease Timeline

What are two important milestones in the history of understanding this disease?

Date	What happened?

Look through the rest of *Disease Detectives* to find other diseases caused by the same type of microbe, either bacteria or viruses.

Disease or microbe name	How transmitted? (Food/water or air or vector)	Interesting fact

Disease Detectives: Transmission and Technology

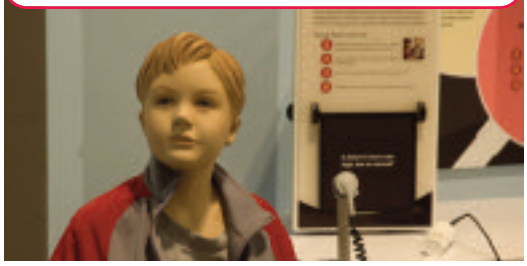
How is the disease in each case spread?

Investigate infectious disease mysteries by gathering data about three cases of infection. They are grouped by the method of disease transmission. Look at each case.

Technologies (old and new)

Technologies (both old and new) are being used in detection, diagnosis, treatment or prevention in these diseases. Find an example in each scenario. Indicate which area of use and explain how it helps to fight the disease.

1) The Case of the Birthday Surprise



Example of Technology:

Area of use: detection, diagnosis, treatment, or prevention (Circle one)
Explain:

How was the disease spread?

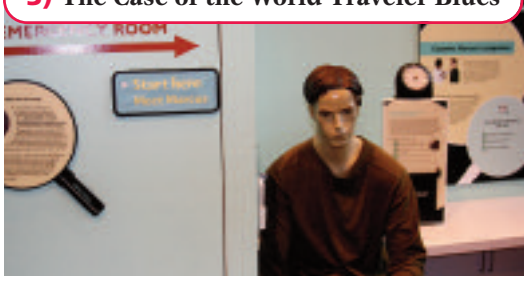
2) The Case of the Unwelcome Visitor

Example of Technology:

Area of use: detection, diagnosis, treatment, or prevention (Circle one)
Explain:

How was the disease spread?

3) The Case of the World Traveler Blues



Example of Technology:

Area of use: detection, diagnosis, treatment, or prevention (Circle one)
Explain:

How was the disease spread?

Emerging and Re-emerging Diseases

"1979: Smallpox is defeated!" reads the Disease History Timeline entry.

Choose one of the following diseases:

Tuberculosis Cholera Malaria Influenza

Look for information in the exhibition: what makes it difficult to combat or eliminate that disease?