



Solving a Mystery with Science



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How the project started



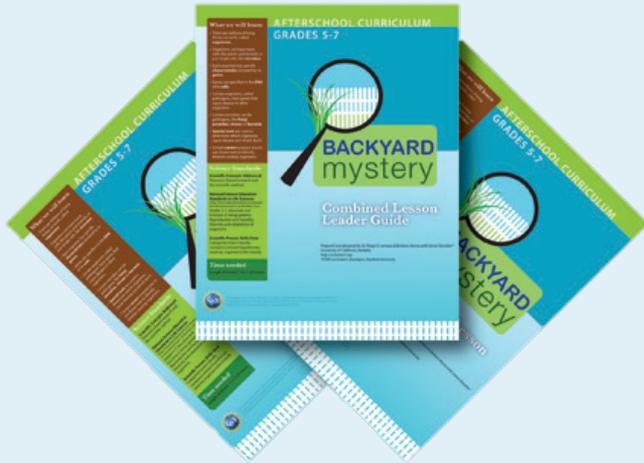
STEMware™ project, “Collaborative Research Strategies: Designing Immersive Biology Learning Simulations for Formal and Informal Settings”.



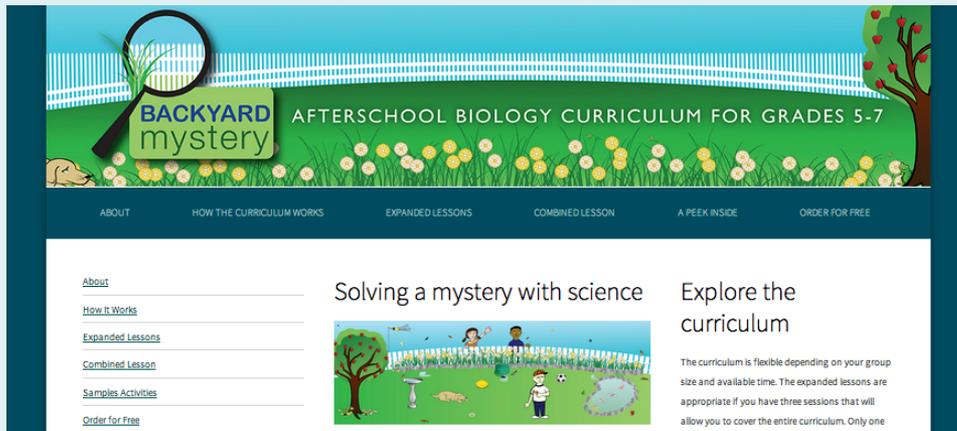
- Funded by the National Science Foundation in 2009.
- Resulted in a “serious cybergame”, “Zombie Plague” for high school-aged players. <http://pbge.ucdavis.edu>
- Explores biology-related game scenarios and careers.



Backyard Mystery



- Companion to Zombie Plague, with same topic areas: diseases, pathogens and careers
- Uses interactive paper and hands-on activities for afterschool venues for grades 5-7.
- Intended for groups of 8 to 20 participants



Goal:
Curriculum intended to engage students in genetics, genomics, biotechnology and the bioSTEM workforce.

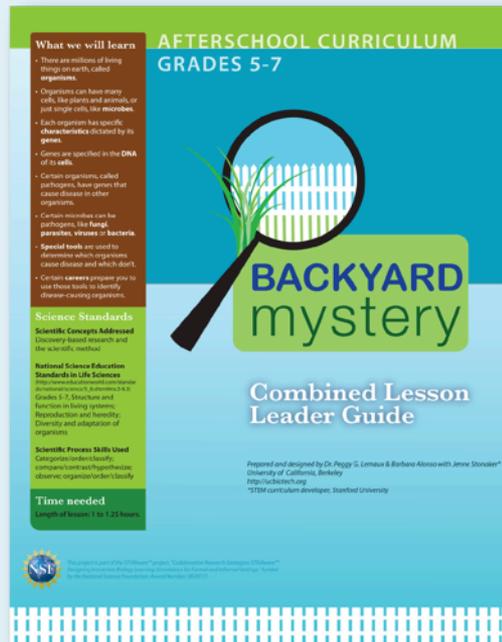
<http://ucbiotech.org/backyardmystery>



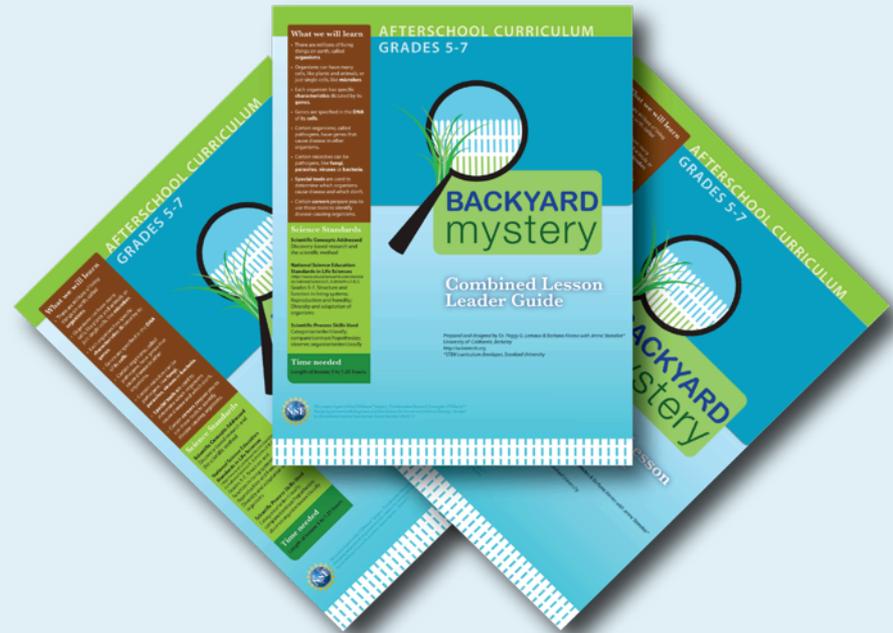
Organization of curriculum

Designed in two formats for different afterschool learning situations.

Combined Lesson

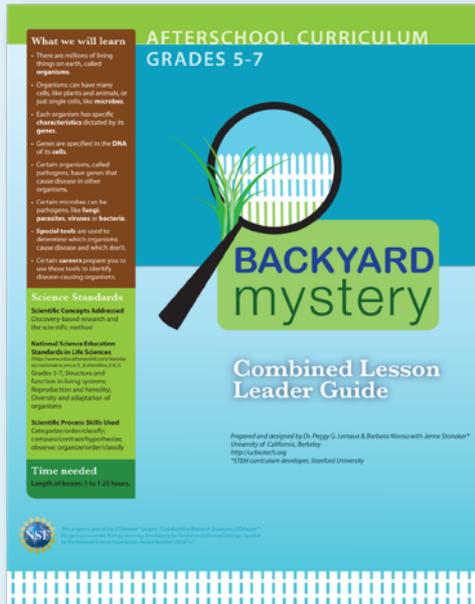


Expanded Lessons



Combined Lesson

Three sections to be completed in one 1.5h session.



Section 1: introduces four types of disease-causing organisms through a matching game.

Section 2: features four backyard panels; tools introduced to identify culprits causing diseases. Puzzle pieces given after paper-based activities completed for each tool.

Section 3: puzzle pieces are decoded to identify culprits causing problems in backyard. STEM careers are introduced.



Expanded Lessons

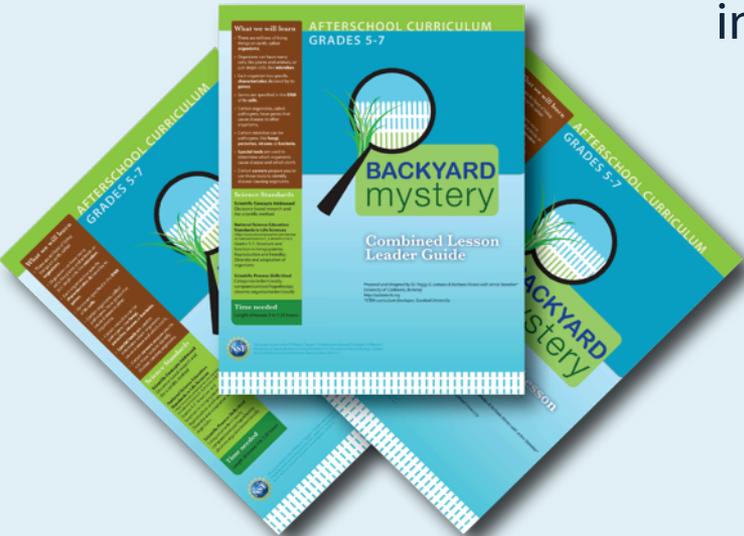
Each Section of Combined Lesson is expanded into a stand-alone 1-hour lesson.

Lesson 1: introduces four types of disease-causing organisms through a matching game.

Lesson 2: features 4 backyard panels and tools to identify culprits causing diseases. Puzzle pieces given after completion of paper-based or hands-on activities for each tool.

Lesson 3: identifies culprits causing backyard problems by decoding puzzle pieces. Introduces STEM careers.

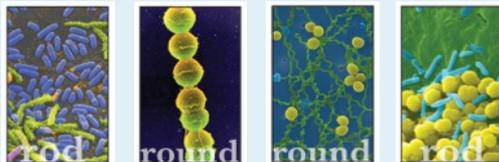
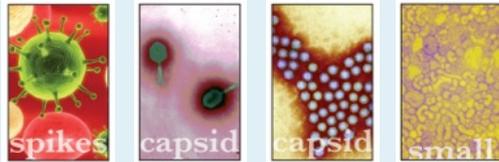
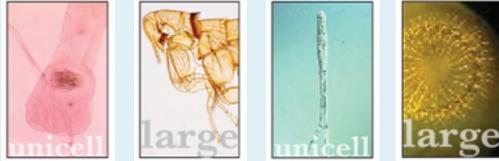
Provides both types of activities allowing leader to repeat parts to give participants more exposure to content.



Learning about organisms



Section 1/Lesson 1: First activity introduces four different types of disease-causing organisms through a matching game.



F U N G U S

P A R A S I T E

V I R U S

B A C T E R I A

- Colorful images include clues to guess identity of organism.
- Reverse side of card gives letters that spell out name of organism.
- Participants use image- or letter-side of cards to group them by organism.

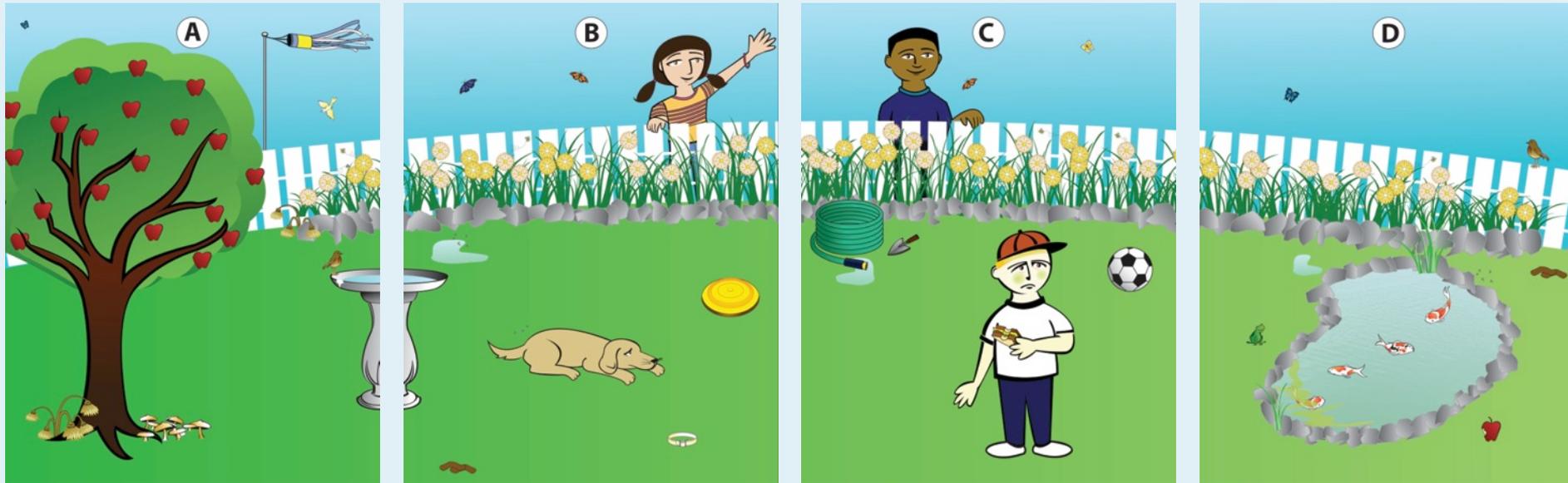
LESSON LEARNED: Group learns there are some traits that identify each organism, but these traits don't tell which organisms cause disease.



Participants receive scientist “in training” badges once they identify the four types of organisms .

Introduction to the Backyard

Participants are introduced to a backyard scene split into four panels.



Section 2/Lesson 2: Each panel has clues indicating something is “not right”. Some clues are helpful, some are not.

Problem in each panel is caused by one of four organisms, or culprits, introduced in matching game.



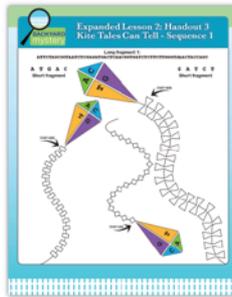


- Leader chooses one panel to determine “culprit”.
- Scientists use “Cool Tools” to determine “culprit” causing disease. Participants learn about tools by completing activities.

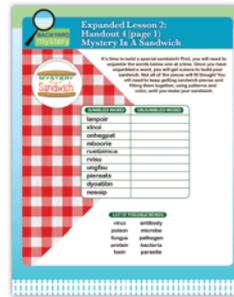
“Cool Tools”

PAPER-BASED

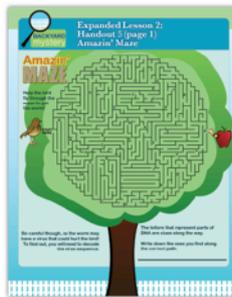
PCR “Kite Can Tell Tales”



ELISA “Mystery in a Sandwich”



DNA sequencing “Amazin’ Maze”



Morphology “Jumbled Job”

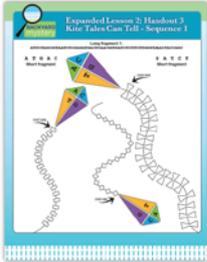


- For **Combined Lesson, Section 2** paper-based activities are used to teach about four “Cool Tool” technologies.
 - **PCR**
 - **ELISA**
 - **DNA Sequencing**
 - **Morphology**

In **Expanded Lesson 2**, leader can choose either paper-based activities or hands-on activities for each tool.

PAPER-BASED

PCR
"Kite Can Tell Tales"



ELISA
"Mystery in a Sandwich"



DNA sequencing
"Amazin' Maze"

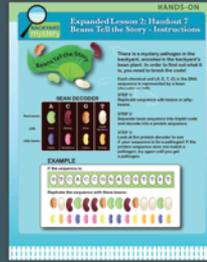


Morphology
"Jumbled Job"

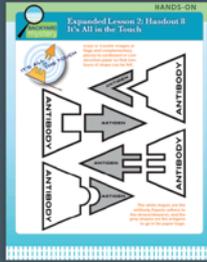


HANDS-ON

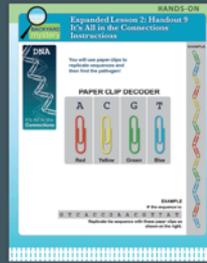
PCR
"Beans Tell the Story"



ELISA
"It's All in the Touch"

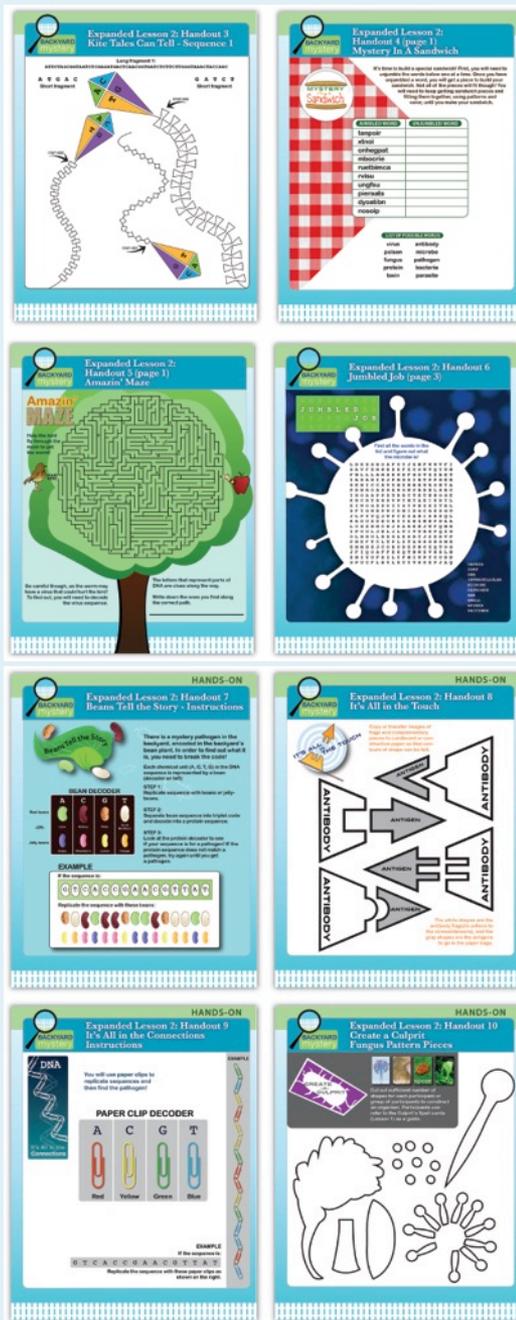


DNA sequencing
"It's All in the Connections"

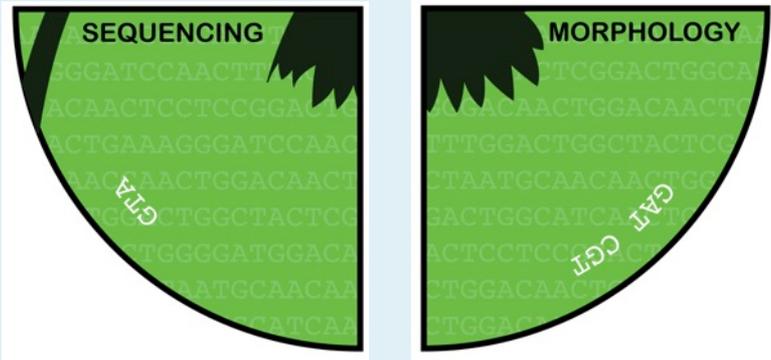
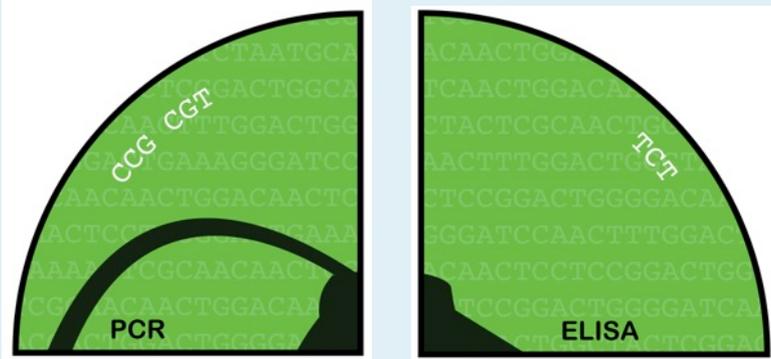


Morphology
"Create a Culprit"

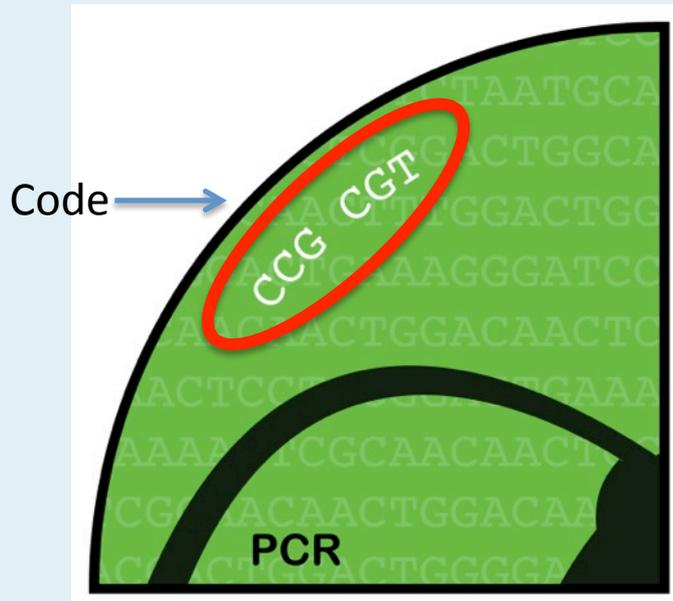




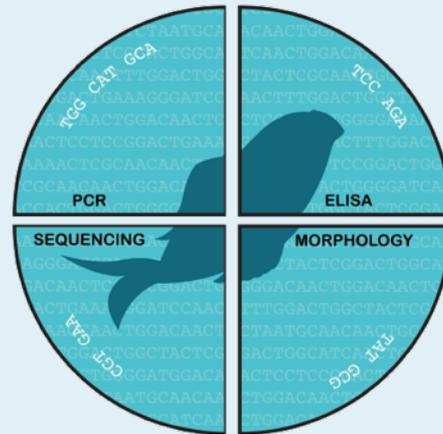
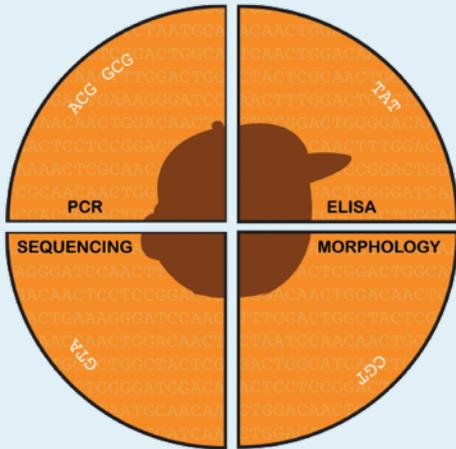
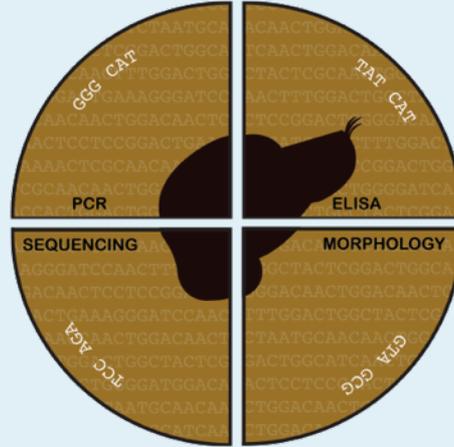
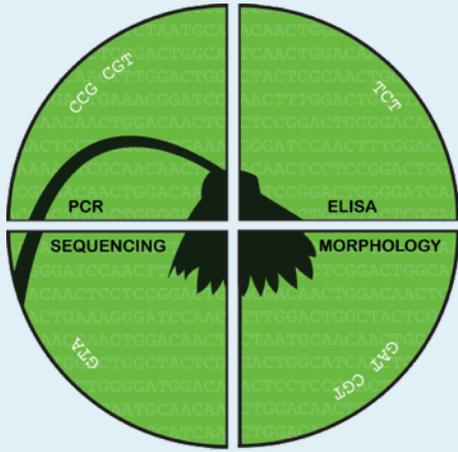
- Colorful activities of both paper and hands-on types are provided for each tool.
- Hands-on activities use commonly sourced materials.
- Each group performs one “Cool Tool” activity concurrently.
- At lesson’s end participants share what they learned about each technology in a “teach back”.



After each activity, participant gets a puzzle piece associated with their panel and the the particular technology they used.

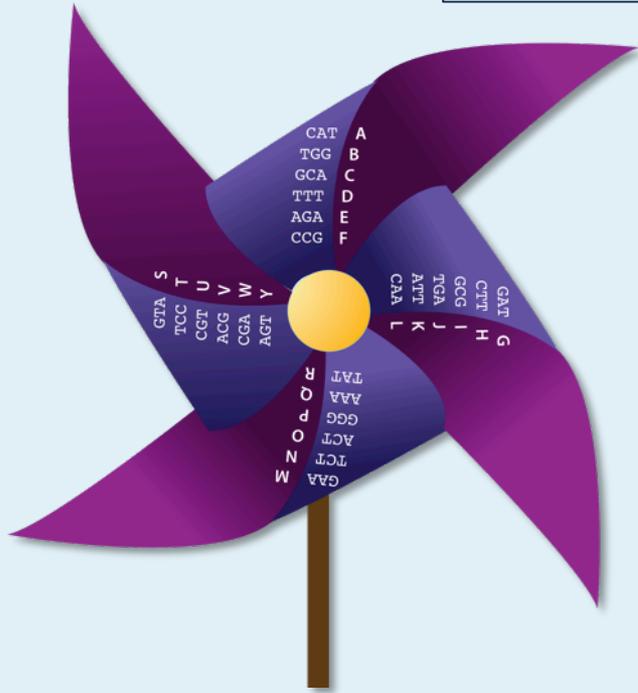


Each puzzle piece contains code. When all four pieces are assembled, the letters can be decoded to reveal the culprit's identity.



Unique puzzle pieces are provided for the four Backyard panels. Images of what wasn't "right" in each of the four panels are in the center, e.g., flower, fish, dog, boy.

Reveal the culprit



Section 3/Lesson 3: Provides a decoder for participants to use to learn which organism was responsible for the disease in their backyard panel.

Decoder

FUNGUS
CCG CGT TCT GAT CGT GTA

PARASITE
GGG CAT TAT CAT GTA GCG TCC AGA

VIRUS
ACG GCG TAT CGT GTA

BACTERIA
TGG CAT GCA TCC AGA TAT GCG CGT GAA



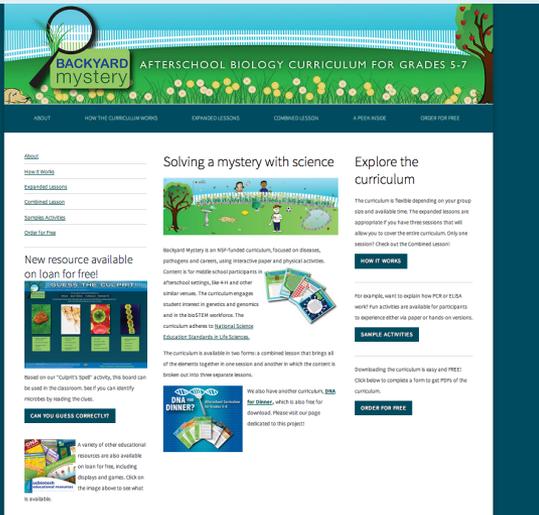
After “culprit” is identified and mystery is solved, participants get new badges, depending on which organism they identified as causing the problem.

Exploring careers

Participants are introduced to careers in STEM fields through “Jeopardy™”-type game.

How to access curriculum

- Backyard Mystery is **complimentary!**
- Visit <http://ucbiotech.org/backyardmystery> ; complete form on website and submit.
- All lessons available as PDF downloads.
- Users requested to complete brief survey to help improve curriculum and identify additional areas of interest.



The screenshot shows the website header with the logo and title "BACKYARD mystery AFTERSCHOOL BIOLOGY CURRICULUM FOR GRADES 5-7". The navigation menu includes "ABOUT", "HOW THE CURRICULUM WORKS", "EXPANDED LESSONS", "COMBINED LESSON", "A PEEK INSIDE", and "ORDER FOR FREE". The main content area is titled "Solving a mystery with science" and "Explore the curriculum". It features a central illustration of a field with people and a magnifying glass. Text describes the curriculum as an NSF-funded program focused on diseases, pathogens, and careers, using interactive paper and physical activities. It is available in two forms: a combined lesson or expanded lessons. A "NEW RESOURCE AVAILABLE ON LOAN FOR FREE!" section highlights a "GUESS THE GAMES" board game. A "CAN YOU GUESS CORRECTLY?" section features a "DISEASE DISCOVER" board game. A "PEEK INSIDE" section shows a sample of the curriculum materials. A "CAREER CONNECTIONS" section lists various careers related to the curriculum. A "DOWNLOAD THE CURRICULUM" section provides a link to download the curriculum. A "ORDER FOR FREE" button is located at the bottom right of the page.

Other educational resources



- Besides Backyard Mystery, "DNA for Dinner" curriculum, educational displays, games and handouts are available.
- All are **complimentary**
- Visit Resources section of <http://ucbiotech.org> for more information.

For more information

Backyard Mystery

<http://ucbiotech.org/backyardmystery>

More educational resources available in Resources section at

<http://ucbiotech.org>

Zombie Plague

<http://pbge.ucdavis.edu>

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