Away On The Bay

Ranger Rick Magazine, Nature Scope

This is the tale of a town called **Away**—
A town that was built on the shore of a bay.
A town where the folks didn't think much about
What they dumped in their water day in and day out.

For one thing, a sink was an excellent place
To get rid of messes and not leave a trace.
Cleansers and cleaners and yesterday's lunch
Went **away** down the drain with a gurgly crunch.

At everyone's house there was laundry to do.
Day after day, how those laundry piles grew!
Load after load was washed, rinsed, and spun
And **away** went the water when each load was done.

On Main Street each day there were sidewalks to sweep.
The litter and dirt were swept into the street.
And then when it rained, everything washed **away**
Into drains in the roads that dumped into the bay.

A mill there made "stuff" for the townsfolks to use,
But a pipe from the mill churned out oodles of ooze.
And the ooze, well it goozed from the pipe to the bay
Where it bubbled and glubbed as it drifted **away**.

When the weather was warm, it was always a treat
To sail on the bay and bring picnics to eat.
But when folks were finished, they'd toss all their trash
Overboard and away with a plop and a splash.

Then folks started seeing that things weren't quite right;
The bay had become an unbearable sight.

Beaches were covered with garbage and glop
That rolled in with the waves—and the waves didn't stop.

The fish in the bay all seemed sluggish and sick,
The algae was everywhere—slimy and thick,
The birds near Away were all suffering too,
'Cause the fish they were eating were covered with goo.

So a meeting was called to discuss the sick bay
And townspeople came from all parts of **Away**.
And during the meeting one person proclaimed,
"I know who's at fault: We all should be blamed."

"For years we've washed chemicals, dirt, and debris
Down our sinks, off our streets, and out pipes—
So you see,
Although we all thought that our waste went **away**
It all ended up going into the bay."

"Now the bay is a mess—full of trash, soap, and goo
The water's turned green—like a bowl of pea soup,
And our wildlife is sick from the garbage and grime.
The bay needs our help, right now while there's time.

The folks were all silent—they knew it was true.
And they realized now what they all had to do.
It was time to get busy—the bay couldn't wait.
If they didn't act now, it might soon be too late.

So they signed an agreement that very same minute
To care for the bay and to stop putting in it
The stuff that had made the bay icky and ill,
Like soaps that pollute and ooze from the mill.

They also agreed to stop dumping their trash

Overboard and away with a plop and a splash.
And all of their efforts have been a success:
Today the bay's clean and no longer a mess.

And that is the tale of the town called **Away**—
A town where the people, to this very day,
Remember a saying that's simple and plain:
Nothing just goes **away** when it's washed down the drain.

Ocean: Non-Polluted Photos

http://img0.mxstatic.com/wallpapers/0f458fce470938f1695a8f9865485f17_large.jpeg

http://myteachermissoh.weebly.com/uploads/4/5/3/7/45371531/4792504_orig.jpg

http://bear.joneskilmartingr.netdna-cdn.com/news/wp-content/uploads/ocean1.jpg

http://chainimage.com/images/wallpaper-ocean-hd-hd-pictures-4-hd-wallpapers.jpg

Ocean: Polluted Photos

http://www.greenpeace.org/usa/wp-content/uploads/2015/06/GP01B4T-ocean-pollution.jpg

https://share.america.gov/wp-content/uploads/2015/05/shutterstock_150820259.jpg

https://student.societyforscience.org/sites/student.societyforscience.org/files/main/articles/860%20undersea_trash.jpg

http://plastic-waste-pollution.weebly.com/uploads/1/4/1/5/14155952/7657847_orig.jpg

New plastic-eating bacteria has potential to ease world's trash glut

By Karl Mathiesen, The Guardian, adapted by Newsela staff
03.18.16

Grade Level **8** Word Count **863**

A team of Japanese scientists has found a species of bacteria that eats the type of plastic found in most disposable water bottles. Photo: Anacleto Rapping/Los Angeles Times/TNS

Nature has begun to fight back against the vast piles of filth dumped into its soils, rivers and oceans. It has evolved a plastic-eating bacteria — the first known to science.

A team of Japanese researchers has discovered a bacteria that can break the molecular bonds of one of the world's most-used plastics: polyethylene terephthalate, also known as PET or polyester.

The Japanese research team sifted through hundreds of samples of PET pollution before making their discovery. They eventually came upon a colony of bacteria using the plastic as a food source.

Additional tests found that the bacteria almost completely broken down low-quality plastic within six weeks. This was extremely fast when compared with other biological agents recently found to have an appetite for PET, including a related bacteria, leaf compost and a fungus enzyme.

Bacteria Are Very Adaptable

Tracy Mincer, a researcher at Woods Hole Oceanographic Institution, said the new study was very carefully done. It is the first study to show plastic being completely hydrolyzed — broken down — by bacteria, he said.

The molecules that form PET are bonded very strongly, said professor Uwe Bornscheuer. “Until recently, no organisms were known to be able to decompose it.”

The newly discovered bacteria has been named Ideonella sakaiensis 201-F6. The research team suspects it may have evolved enzymes specifically capable of breaking down PET in response to the accumulation of the plastic in the environment in the past 70 years.

Such rapid change in a bacteria's structure is possible, said Enzo Palombo, a professor of microbiology. Bacteria have an extraordinary ability to adapt to their surroundings, he said. “If you put a bacteria in a situation where they’ve only got one food source to consume, over time they will adapt to do that.”

“I think we are seeing how nature can surprise us” and how quick to recover it can be, Mincer added.

Plastics = Potential Pollution

The bacteria took longer to eat away highly crystallized PET, which is used in plastic bottles. Unfortunately, that means the enzymes and processes would need refinement before they could be useful for industrial recycling or pollution clean-up.

“It’s difficult to break down highly crystallized PET,” said professor Kenji Miyamoto, who took part in the new study. “Our research results are just the initiation for the application. We have to work on so many issues needed for various applications. It takes a long time,” he said.

One-third of all plastics end up as garbage polluting the environment. Millions of tons of plastic end up in the ocean every year, creating vast accumulations of life-choking rubbish.

PET makes up almost one-sixth of the world’s annual plastic production. Despite PET being one of the more commonly recycled plastics, the World Economic Forum (WEF) reports that only just over half is ever collected for recycling and far less actually ends up being reused.

Breaking Down Ocean Trash

Advances in biodegradable plastics that break down on their own and in recycling offer hope for the future, Bornscheuer said. However, such advances do not "help to get rid of the plastics already in the environment."

Nonetheless, the potential applications of the newly discovered bacteria remain unclear. The most obvious use would be as a biological agent in nature, Palombo said. Theoretically, bacteria could be sprayed on the huge floating trash heaps building up in the oceans. A similar method, using a different bacteria, is already employed to combat oil spills.

Unfortunately, the newly discovered bacteria would not be useful in the ocean. It only consumes PET, which is too dense to float on water. However, Bornscheuer said, the discovery could open the door to the discovery or manufacture of biological agents able to break down other plastics.

Palombo said the discovery suggested that other bacteria may have already evolved to do this job and simply needed to be found.

"I would not be surprised if samples of ocean plastics contained microbes that are happily growing on this material and could be isolated in the same manner," he said.

However, Mincer said, breaking down ocean trash comes with dangers of its own. Plastics often contain additives that can be toxic when released. Plastic debris may actually be less dangerous before it is broken down, he said.

Recycling Figures In

Beyond dealing with the plastic already fouling up the environment, the newly discovered bacteria could potentially be used for recycling.

Miyamoto's team suggested that the environmentally harmless elements left behind by the bacteria after the PET was broken down could be the same ones from which the plastic is formed. If this were true, perhaps a process could be developed to isolate those elements, Bornscheuer said. Perhaps PET could be produced without the need for oil-based starting materials, which could provide huge savings, he added. According to the WEF, 6 percent of global oil production is devoted to the production of plastics.

However, the plastics industry said the need for a new biological process to replace or add to the current mechanical recycling process is very small.

"PET is 100 percent recyclable," said Mike Neal, the chairman of the Committee of PET Manufacturers in Europe. Switching to using bacteria would not make much economic sense, he said.

Public Service Announcement

PSA Assignment and Grading Rubric

For this assignment, your group will brainstorm ideas and come up with a PSA that focuses on the problem of plastic pollution in the ocean and you must include at least one believable solution to this problem. You will work with your groups to write, produce, and present a live or recorded PSA. Use the guidelines below to develop either a 30-second or 60-second spot. Media messages are fleeting (short lived). One compelling central message, clearly presented with a simple call to action, is the most effective way to get your point across.

Assignment

1. Begin by answering the following questions in your science notebooks:

- Target Audience: Who do I want to reach with my message?
- Message: What is my message? What do I want the viewer to understand?
- Action Step: What is the call to action? What do I want the viewer to do? How can the viewer help solve the problem?
- Significance of Issue to the Public: Why is this issue important to the public?

DUE: _____

2. Turn in a written script of the PSA describing the actions of the presenters and the words that will be spoken. Your script should be based on your answers to questions 1-4 above plus any other information or research about the issue. Remember to keep in mind the population the PSA addresses or serves. (Example: If you are aiming your PSA for middle school students, then use actions and words that will appeal to them.) Document your sources.
DUE: _____

3. Create a shot list and storyboard **and get teacher approval BEFORE** you begin shooting. A shot list gives a written description of the shots you are planning: locations, actions, objects, actors, etc. A storyboard is a visual representation of the different shots (shot sketches) in the order they will appear in the finished work, and includes compositional information (close up, pan, wide shot, etc.) as well as audio (where the narration comes in or if there is music over the shot). Your drawings can be simple stick figures.
DUE: _____

4. Be sure to reading it aloud and practice the actions with a stopwatch. PSAs are 30 or 60 seconds in length. No longer.
DUE:_____

5. Be sure to turn in your approved shot list, storyboard, and script when you screen your PSA for the class. Reflection about the process and your PSA presentation will be completed as part of your final grade.

PSA Grading Rubric **Name(s)**_____

Adapted from Arizona State University & Read-Write-Think

PSA Components	5	4	3	2	1
Technical Aspects Live perfomance/video reflects effective team work, editing skills, use of lighting and sound that add to the overall mood/message/theme of the piece.					
Creativity The message is told in unexpected or novel ways. Elements in the message are woven together with insight and imagination grabbing the attention of the intended audience.					
Tag Line The message is clear and concise. A single thought or phrase within the PSA summarizes the entire message.					
Social Benefit The ideas shown have an application to the lives of the targeted audience. The PSA is one that will motivate change to improve the targeted audience's community in a meaningful way.					
Facts The message is based on accurate and verifiable information. Opinion or bias expressed is based in and supported by fact. Source information has been verified and documented.					
Follow-up Follow-up information is provided to direct the intended audience to local or national advocacy groups.					
Collaboration Almost always listens to, shares with, and supports the efforts of others in the group. Tries to keep people working together.					
Written Work All deadlines are met. Storyboard, shot list, and script have been approved before shooting and are turned in at the final screening.					

Scoring Guide:

5 = The highest score possible; indicates a highly effective use of a component. Exemplary demonstration of effort and achievement throughout the video.

4 = Accomplished use of component(s) is consistently demonstrated throughout the video.

3 = Elements described may be present, but are inconsistently or haphazardly applied.

2 = Effort is demonstrated towards incorporating the component(s) listed and described, but the desired results are not seen in the final product.

1 = Score of 1 reflect the absence of the described elements.

Station Directions/Labels

Station 1 World Map Activity

1. Label the map with the names of the world's oceans.
2. Go to the website: https://oceanservice.noaa.gov/facts/gyre.html and read the information.
3. Draw the 5 major gyres on your map and label them with their names.
4. Tape the map into your notebook.

Station 2 Polluted Ocean Photos Activity

1. Write at least 2 observations for each photo in your notebook.

Station 3 Pan of Plastic Waste

1. Observe the objects in the pan.
2. Select at least 4 items you use daily and write in your notebook how they can be recycled or disposed of properly.

Station 4 Vocabulary Building

1. Look at the set of Vocabulary Cards displayed.
2. Write the vocabulary word and its definition in your notebook.
3. Draw an image that shows what the word means.

Station 5 Clean Ocean Photos Activity

1. Write at least 2 observations for each photo in your notebook.

Station 6 Clean Ocean Photos Activity

1. Read “New plastic-eating bacteria has potential to ease world's trash glut” article.
2. Highlight the 10 sentences you think are the most important.
3. Write a summary of the article in your notebook.

Self Grading Sheet/Refection **Name**_____

Tasks that I performed to help the group produce the PSA.

Score I think I earned (Use percentages 0% to 100%) _____

My favorite parts of this assignment were (describe in sentences at least three things):

My least favorite part of this assignment was (describe in sentences at least one thing):