

HOWARD B. OWENS SCIENCE CENTER
WATERS OF LIFE AND DEATH – 7TH AND 8TH GRADE
First Quarter, 2016 – 2017
POST-PROGRAM ACTIVITY

The following are suggested extensions of the Waters of Life and Death program that can be completed back at school.

1. We talked about and analyzed freshwater, tap water and sea water.
 - Do you believe that they remain completely separate and independent of each other, such that changes in any one type of water do not affect the others? Explain your answer.
 - Where do you believe our wastewater goes, and how is it prevented from contaminating streams, oceans and reservoirs?

Watch the following video: <https://www.youtube.com/watch?v=al-do-HGulk> (The Water Cycle by National Science Foundation), and see whether you would like to change your answers.

2. At this summer's Olympics in Rio, there were concerns about the safety of the water athletes swam and sailed in. Read the attached CNN article: "Superbacteria' Discovered in Rio's Waters as Olympics Near."
 - How did bacteria enter Rio's sea water?
 - Why do you believe that the bacteria leaving Rio's hospitals is called 'Superbacteria'?
 - What solutions can you suggest to this problem? How confident are you that we are able to effectively maintain water safety in Maryland by using ideas like the one you suggested?
3. Think of a tap water safety crisis that occurred recently: maybe the one that occurred in Prince George's County this summer? Or the recent crises in Flint, Michigan or Elk River, West Virginia. Afterwards, several professionals including scientists, doctors, activists, lawyers, journalists, local and federal government officials, and filmmakers: identified the dangerous chemical(s) or organisms; traced the contamination to its source; informed the public about risks; and worked to fix the problem.
 - Which professional would you most like to be? Explain. What first steps could you take now on the path to that career? [Seventh Graders only: Go to the PGCPs website and find one or two career academies that could help you prepare for that career .]

'SUPER BACTERIA' DISCOVERED IN RIO'S WATERS AS OLYMPICS NEAR

By Flora Charner, CNN, 7/5/16

Rio de Janeiro (CNN) A group of Brazilian scientists has detected a drug-resistant bacteria growing off some of Rio de Janeiro's most stunning beaches, in research being published a month before the city hosts the 2016 Olympic Games.

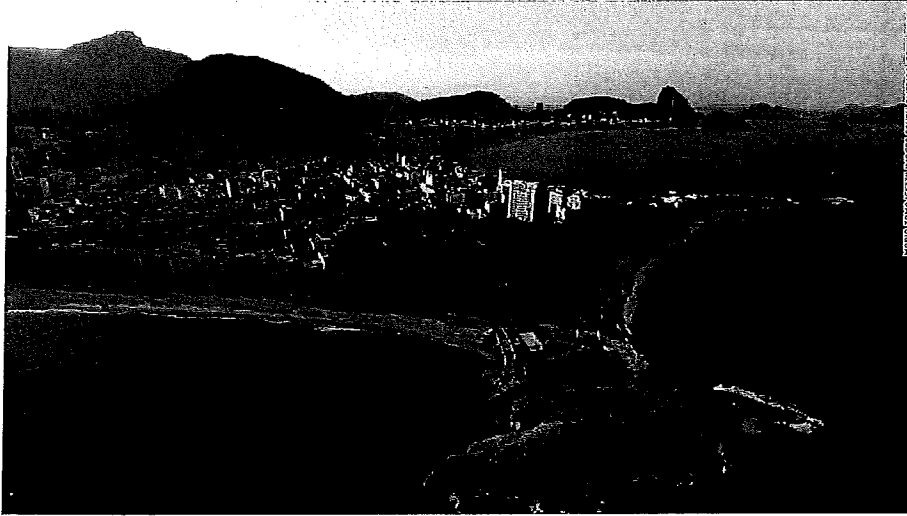
According to lead researcher Renata Picao, the "super bacteria" entered the city's waterways when sewage coming from local hospitals got channeled into the bay.

"We have been looking for 'super bacteria' in coastal waters during a one-year period in five beaches," Picao told CNN during a visit to her lab. "We found that the threats occur in coastal waters in a variety of concentrations and that they are strongly associated with pollution." The samples were collected between 2013 and 2014. The superbug found was carbapenem-resistant Enterobacteriaceae, or CRE. Picao said there is no reason to believe the levels have changed because raw sewage continues to flow into many waterways. She said the next step is to test the impact these bacteria can have when humans come in contact with them in coastal waters.

The news comes as Rio prepares to host hundreds of thousands of athletes and tourists during next month's Summer Olympics. Among the beaches flagged were Flamengo and Botafogo, which border the bay where Olympic sailors are scheduled to compete. "It's a nice sailing area but every time you get some water in your face, it feels like there's some alien enemy entering your face," German Paralympic sailor Heiko Kroger said during a recent visit to Rio. "I keep my nose and my lips closed." Kroger believes the super bacteria may have caused a severe skin infection in one of his teammates during recent training.

Picao said she believes the city's fragile sanitation infrastructure is responsible for the presence of the super bacteria. "This bacteria colonizes the intestine and it goes along with feces to the hospital sewage," Picao said. "We believe that hospital sewage goes into municipal sewage and gets to the Guanabara Bay or to other rivers and finally gets to the beach." According to Rio's water utility, Cedae, the criteria established by the World Health Organization have been followed.

"Fifty-one percent of the city's sewage is now treated," production director Edes de Oliveira told CNN. "Seven years ago it was only 11%." A new sewage plant that opened in May in the western part of the city will serve about 430,000 residents. When Rio made its bid to host the Summer Games back in 2009, it promised to clean up the polluted waterways and connect 80% of homes to the sewage system. Despite concerns, neither Picao nor international Olympic authorities recommend moving the sailing venue.



Despite health concerns and it being only a month until the Rio 2016 Summer Olympic Games, neither Picao nor international Olympic authorities recommend moving the sailing venue. "I wouldn't say to change the venues because we don't know the risks yet," Picao said. "We are making this alert because if athletes get infected there is a chance this bacteria is multiresistant and the physicians should know about this." The other beaches that tested positive for the bacteria were Leblon and Ipanema, which are very popular among tourists and locals alike. "I don't take my children to these beaches," Picao said. "We still need more studies to tell what would be the risk to human health of this exposure through the water."