

## California Foundation Offers a Genetics Prize

Difficulty:

**DIFFICULT**

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### *Discussion activities to be done after completing this EA lesson*

Today's report was about a new prize offered by an American foundation. What prizes has this foundation offered before? Who exactly will the new prize be offered to? What will the winning team have to prove?

### *Extension discussion topics*

#### **A. Talking about and going over the specific topic / idea / issue in listening text**

*Introduction = What is the X Prize Foundation? What prizes has it offered in the past? What is the new competition it has announced?*

1. What did you learn in the report about the X Prize Foundation?
  - It is based in California (in Playa Vista, near Los Angeles).
  - It is a charitable organization which motivates (encourages technological achievement with big cash prizes.
  - In the past it has awarded prizes in the fields of fuel-efficient motor vehicles and space exploration (these are examples, can you find any others through your own research?).
2. What did you learn in the report about the latest X Prize to be announced (value, goal, conditions, etc...)?
  - Full name is the "Archon Genomics X Prize".
  - \$10 million will be awarded to a research team that can accurately sequence the genetic code of 100 individuals aged 100 or over, within 30 days, and do it for \$1,000 or less per person.
  - The goals are to get to "real medical applications" of genetic analysis and to understand the genetic reasons why some people can live long healthy lives and avoid the diseases that affect or kill others.
  - The X Prize organization will select the individuals (volunteers) whose DNA is to be analyzed.
  - The competition will begin in January 2013.
3. What did you learn in the report about "genetic sequencing"?
  - First achieved "a decade ago" (this probably refers to the completion of the Human Genome Project, started in 1990 and completed in 2003).
  - Since then, it has become "better, faster, and cheaper"...
  - ... but results can be unreliable ("inconsistent from one lab to the next").
  - It remains more suitable for research than for diagnosing and treating patients (see the first goal above).

## B. Expanding on (one of) the topics / ideas / issues in listening text

*Topic = Applications of DNA Sequencing.*

DNA Sequencing determines the order of the 4 active elements, adenine, guanine, cytosine and thymine (A,G,C,T) in a molecule of DNA. These elements are like the letters of an alphabet which combine to form "words"; the genetic instructions for the development and functioning of a living organism. What applications does DNA sequencing have?

- Forensic biology has been used to solve crimes by proving that a suspect was at a crime scene (using DNA samples of blood, saliva, hair, etc.), to identify illegal products from endangered species, to investigate airplane bird strikes and bird collisions with wind turbines.
- DNA analysis can be used to determine the paternity of a child.
- In paleontology, the race, sex, age and stature of human remains can often be determined by analyzing DNA from bones.
- In medicine, some hereditary diseases can be recognized before birth and others treated with gene replacement therapy.
- In agriculture DNA analysis can help produce more resistant varieties of plants and food crops.
- This list is far from complete.

See also: <http://www.biotecharticles.com/Genetics-Article/DNA-Sequencing-Method-Benefits-and-Applications-248.html>

Are any of these applications frightening in any way? Which and why?

*AND / OR Topic = Past X Prize competitions.*

Check out the X Prize website: <http://www.xprize.org/prize-development>

Choose one of the past competitions and prepare an oral presentation to give to your group, a partner, or your teacher. Include in your presentation the nature and goal of the competition, when it took place, who the winners were, what they won and any applications developed as a result of the competition.

What do you think of the aims and methods of the X Prize Foundation?

## C. Extending discussion of (one of) the topics / ideas / issues in listening text

*Topic = Aging.*

We learn in the report that the competition intends "to isolate (...) the real genetic reason for (some) individuals being able to live long lives and evade diseases that impair or kill millions of people much earlier in life."

- Do you know (of) any people over 100 years old? Are they in good health?
- Do you think / hope that you will live to 100? Why? / Why not?
- Do you hope to benefit from advances in medical science which will allow you to live a long life? Why? / Why not?
- Modern medicine can and does maintain some old people in life when in the past they would have died. Do you think that this is justified? If so, in what cases? (Think of the quality of life, the availability of medical staff and resources, the desires of relatives, etc.)
- Are doctors ever justified in removing life-support systems if they judge an old person's quality of life to be too diminished? If so, in what cases?

*AND / OR Topic = Milestones in Genetics (for scientifically-minded students).*

Genetics is a branch of biology and is the science of genes, heredity, and variation in living organisms. It is a relatively recent science. Research the major figures and discoveries in the development of this science.

- Gregor Mendel, an Austrian abbot and amateur scientist, published in 1864 his work on the hybridization of peas. This was the founding work in genetics but its importance was largely ignored.
- Rediscovery and recognition of Mendel's work by biologists (William Bateson, Thomas Hunt Morgan, Alfred Sturtevant) in the first part of the 20<sup>th</sup> century.
- Identification in 1944 by Oswald Avery, Colin McLeod and Maclyn McCarty of DNA as the molecule responsible for genetic transmission.
- The discovery of the "double-helix" structure of DNA in 1953 by James D. Watson and Francis Crick.
- Discovery, in the following years, of "messenger RNA" (similar to DNA) as the transmitter of genetic instructions.
- The development of different methods of DNA sequencing ("chain-termination" method in 1977 by Frederick Sanger, "polymerase chain reaction" method in 1983 by Kary Banks Mullis).
- The Human Genome Project, launched in 1990 and "completed" in 2003 (8% remained unsequenced and the final chromosome was sequenced in 2006). The project also sequenced the genome of the bacteria e-coli, of the fruit fly, and of the laboratory mouse.

What is the dividing line between "genetics" and "genomics"? Are these terms used correctly in the report? (Think of the difference between the "genotype" and the "phenotype").

### *Audioscript*

The California-based X Prize Foundation has announced their newest competition. The organization, that uses big cash prizes to motivate technological achievement now wants to award fast, accurate and cheap genetic sequencing.

In the past, the X Prize Foundation has sponsored competitions in space exploration and fuel-efficient motor vehicles. Now, it's turned its focus to medical technology.

"The primary goal of this prize is to really get to a point where whole-genomic sequencing has real medical application."

Grant Campany is senior director for the \$10 million Archon Genomics X Prize. The prize will be awarded to a research team that can accurately sequence the genetic code of 100 individuals within 30 days, and do it for \$1,000 or less per person.

Human genome sequencing has become better, faster, and cheaper since it was first achieved a decade ago. But results can be inconsistent from one lab to the next. And so Campany says it's currently more suitable for research than for diagnosing and treating patients.

"A key goal of this prize is to really set a standard for what quality is for whole-genomic sequencing and finally prove to the world that these technologies are truly capable of achieving a quality standard that would have potentially medical applications."

Teams entering the competition will separately work on genetic samples from the same 100 individuals, each of them over 100 years old. When the individual results are combined, X Prize Foundation organizers hope for what they call a "medical-grade" genome that may shed new light on why some people can live for a century in generally good health.

"What we're trying to isolate here is the real genetic reason for these individuals being able to live long lives and evade diseases that impair or kill millions of people much earlier in life."

Grant Company says the X Prize Foundation is actively looking for people willing to contribute their DNA to the competition. They want a diverse group of healthy people 100 years old, or preferably older. The competition begins in January 2013.

That's today's (VOA) Health Brief. This is Art Chimes reporting.