

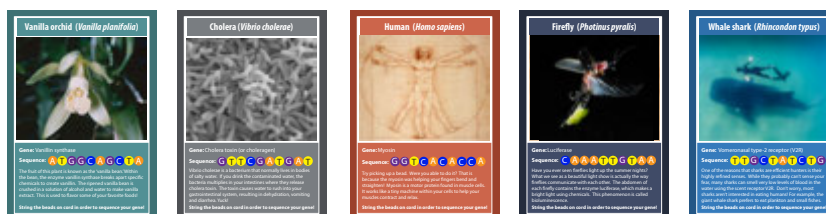
Gene Sequence Bracelets

What is a gene?

Neatly packed within most cells is a special molecule called deoxyribonucleic acid, or DNA. Each piece of DNA is built from four pieces called bases: A, G, C and T. The bases, when connected in a specific order, act like a blueprint to build an entire organism; from a tiny single-celled bacteria to as large as a giant whale shark! DNA molecules are broken into smaller sections, called genes, which define specific properties of an organism. In this exercise, we'll look at five genes from different organisms which give them interesting characteristics.

Instructions

Step 1: Choose one organism – Vanilla orchid, cholera bacteria, human, firefly or whale shark. Be sure to read the card to learn about the gene you will build.



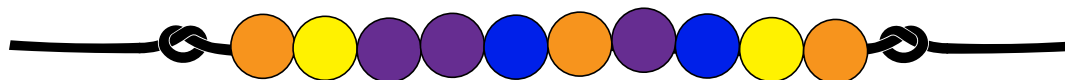
Step 2: Look at the first letter in your DNA sequence. This is a DNA base. Identify the right color bead for that base. Thread the bead onto your string.



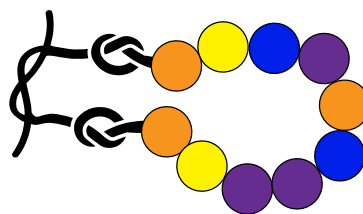
Step 3: Repeat with the rest of the letters in your DNA sequence.



Step 4: Tie a knot before the first bead and after the last bead.



Step 5: Tie both ends together with a knot to make your bracelet.



Vanilla orchid (*Vanilla planifolia*)



Gene: Vanillin synthase

Sequence: A T G G C A G C T A

The fruit of this plant is known as the 'vanilla bean.' Within the bean, the enzyme vanillin synthase breaks apart specific chemicals to create vanillin. The ripened vanilla bean is crushed in a solution of alcohol and water to make vanilla extract. This is used to flavor some of your favorite foods!

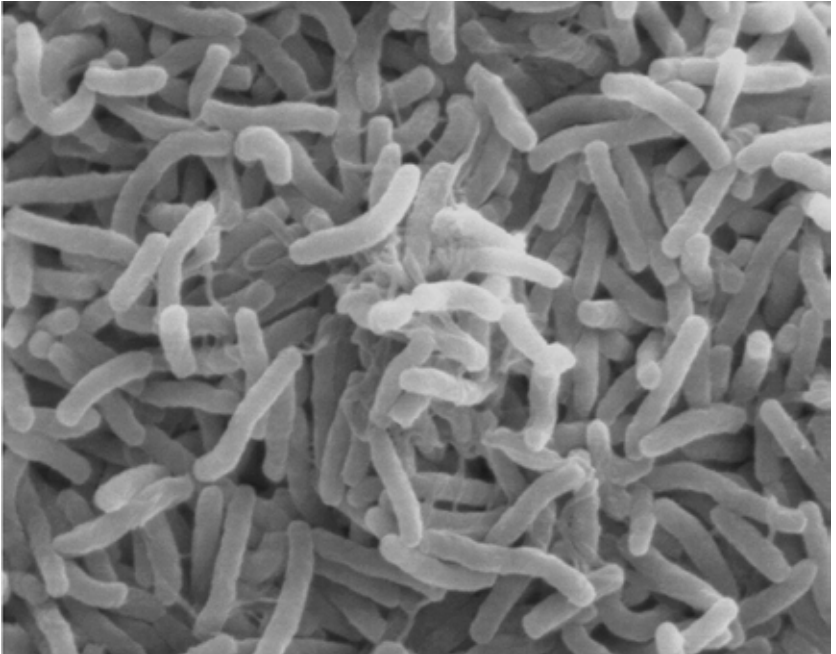
String the beads on cord in order to sequence your gene!



The American Society for Biochemistry and Molecular Biology (ASBMB) is a nonprofit scientific and educational organization with over 12,000 members. The ASBMB depends on the intellectual contributions of its members to create and sustain critically important programs for students, early-career investigators and underrepresented science professionals, among others. Together, we'll continue to advocate for science, connect researchers around the world and build a bright future for biochemists and molecular biologists everywhere.

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Cholera (*Vibrio cholerae*)



Gene: Cholera toxin (or cholera toxin)

Sequence: G T T C G A T G A T

Vibrio cholerae is a bacterium that normally lives in bodies of salty water. If you drink the contaminated water, the bacteria multiplies in your intestines where they release cholera toxin. The toxin causes water to rush into your gastrointestinal system, resulting in dehydration, vomiting and diarrhea. Yuck!

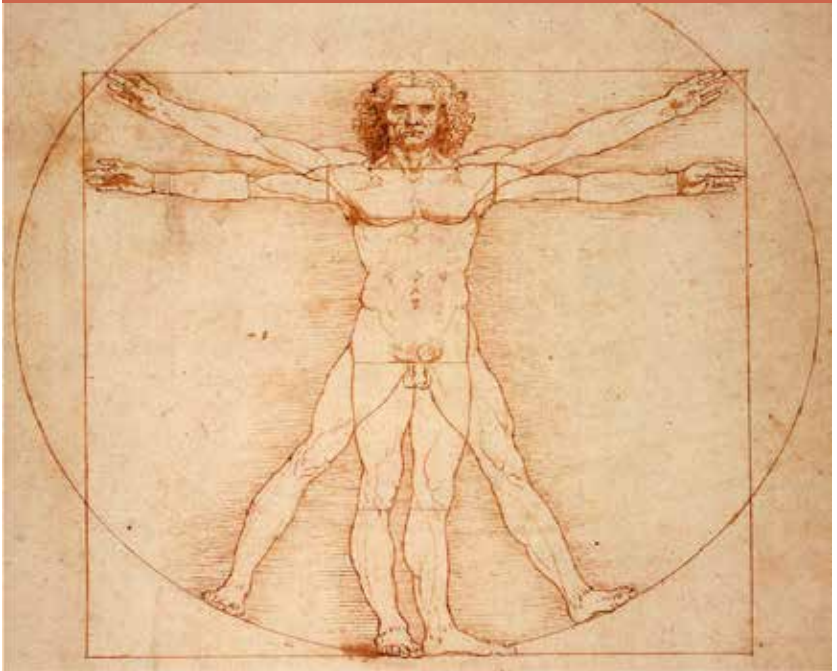
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Human (*Homo sapiens*)



Gene: Myosin

Sequence: G G T C A C A C C A

Try picking up a bead. Were you able to do it? That is because the myosin was helping your fingers bend and straighten! Myosin is a motor protein found in muscle cells. It works like a tiny machine within your cells to help your muscles contract and relax.

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Firefly (*Photinus pyralis*)



Gene: Luciferase

Sequence: C A A A T T G T A A

Have you ever seen fireflies light up the summer nights? What we see as a beautiful light show is actually the way fireflies communicate with each other. The abdomen of each firefly contains the enzyme luciferase, which makes a bright light using chemicals. This phenomenon is called bioluminescence.

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Whale shark (*Rhincondon typus*)



Gene: Vomeronasal type-2 receptor (V2R)

Sequence: T T G C T A T C T G

One of the reasons that sharks are efficient hunters is their highly refined senses. While they probably can't sense your fear, many sharks can smell very low levels of blood in the water using the scent receptor V2R. Don't worry, most sharks aren't interested in eating humans! For example, the giant whale shark prefers to eat plankton and small fishes.

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