



DNA Detectives Gene Assembly

Demonstrators Notes

Learning level	Suitable for all ages
Research themes	Gene Assembly DNA Sequencing Infectious Diseases
Duration	15 minutes to 20 minutes

Workshop Overview

This session will take around 15-20 minutes to complete. It is best suited for a science festival/ community outreach table setting or in conjunction with similar activities in a classroom. This activity is suitable for all ages; however, the boxes vary in difficulty level. One-on-one interaction is typically necessary for participants to fully grasp concepts.

In this activity individuals will learn about genome sequencing and assembly. They will use these concepts to identify DNA found in your gut that could cause illness, such as bacteria or viruses. The different DNA strands “code” for an Astrovirus, Salmonella, and a gut cell. Participants will assemble the DNA (beads on string) by overlapping matching colored beads on the different DNA fragments. The purple and orange beads at the ends of the string determine the orientation of the DNA fragment. Box B contains two fragments of DNA (easy), Box C contains three fragments of DNA (medium), and box A contains four fragments of DNA (hard). After correct assembly, they will use the laminated answer sheet to identify which box (A, B, C) the assembled DNA corresponds with.

Inside each box is a cute toy version of what they identified (Astrovirus, Salmonella or an intestine cell) as well as some fun facts and basic laboratory materials (plaque assay plate, petri dish, tissue culture flask) to help further explain what they have identified. After looking at the contents of the box, the participant moves onto the next gene assembly puzzle.



Workshop Protocol

Hands-On Activity	Description	Timing	Equipment
What is DNA?	<p>Warm up introduction about how all cells contain DNA and the function of DNA.</p> <p>To help younger children understand, identify some easily recognizable traits (hair color, eye color, height, etc.) that their DNA codes for! If you are engaging with an adult, maybe mention something your DNA codes for that isn't obvious- such as your taste!</p>	2-5 minutes	
DNA in our poo	<p>Explain how our poo contains many different kinds of DNA from things like gut cells, bacteria and viruses.</p> <p>Don't be afraid to get silly with it!</p>	2-5 minutes	Stuffed Poo Toy



<p>How can we identify what is in our poo? Genetic sequencing and gene assembly</p>	<p>DNA is very long, so we cannot sequence the whole thing at once- we must sequence pieces of the DNA and piece it together using overlapping sequences.</p> <p>Young children might find this difficult to grasp. Try using a puzzle analogy to help them understand!</p> <p>Use this opportunity to talk about how you may use gene sequencing/assembly in your research.</p>	<p>2-5 minutes</p>	<p>DNA Detective sign</p>
<p>Hands on gene assembly with colored beads</p>	<p>Box A- hard Box B- easy Box C- medium</p> <p>Start with box B and help participants figure out how the fragments overlap to create a single sequence. If they're stuck, suggest sliding one strand back and forth or tell them to look for a spot</p>	<p>5-10 minutes</p>	<p>Colored Strings and laminated answer sheet</p>



	<p>where there are multiples of the same colored bead.</p> <p>Once they have correctly assembled the gene, have them use their detective skills to identify which box their DNA corresponds on the answer sheet.</p>		
Box reveal	<p>Go through contents of box B explaining what each item is.</p> <p>Ask if they have ever heard of Astrovirus/salmonella/ceciac's disease or a gluten free diet?</p> <p>This is another opportunity to talk about how your research and how it may relate to the participant!</p> <p>Afterwards, have them start on the next gene assembly puzzle!</p>	2-5 minutes	Contents of box A, B or C