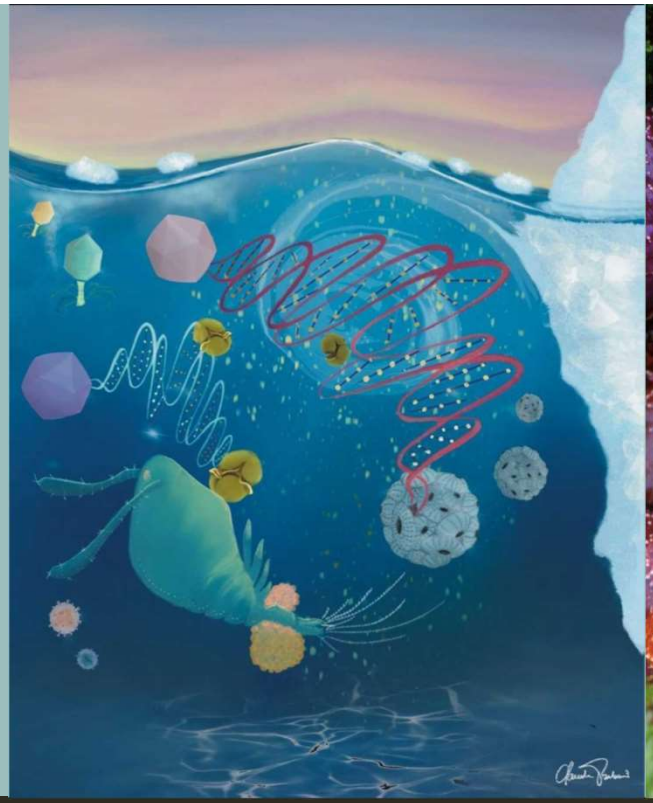


THE MYSTERY OF THE MELTING SEA STARS

NEISCI
USC Postdocs
LA Public Library

IN 2012, SEA STARS STARTED TO DISAPPEAR

WHAT IS HAPPENING TO THE SEA STARS?

atypical

typical

Photos from UCSC

CAUTION: THE NEXT SLIDE IS GOING TO BE GROSS

WHAT IS HAPPENING TO THE SEA STARS?

Photos from UCSC

CLEARLY WE HAVE A MYSTERY TO SOLVE
HOW DO WE SOLVE THE MYSTERY?

Why do you think the sea stars are melting or falling apart?

Could we be looking at a sickness or illness?

What causes sickness or illness?

How do we observe or find things that are really small?

What clues can we use to find small organisms?

CLUES ORGANISMS LEAVE IN THE ENVIRONMENT

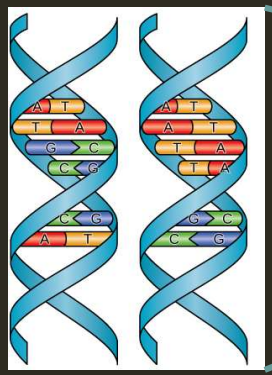
Scientists use something that all organisms have to find out if organisms are in a location

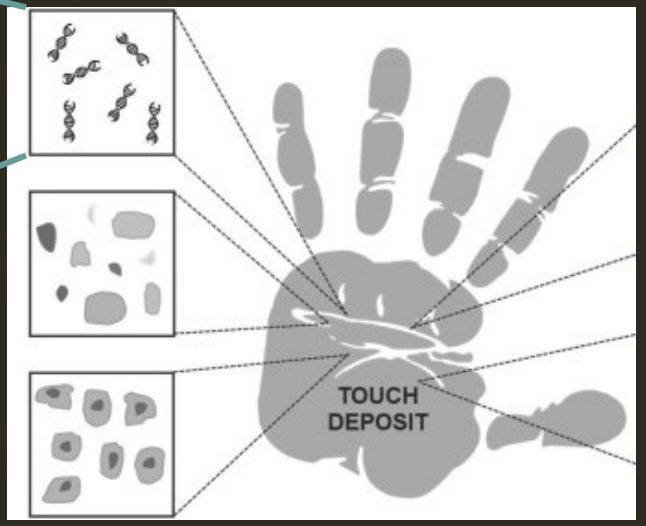
What could this be?

DNA

All organisms have DNA.

All organisms also leave DNA behind

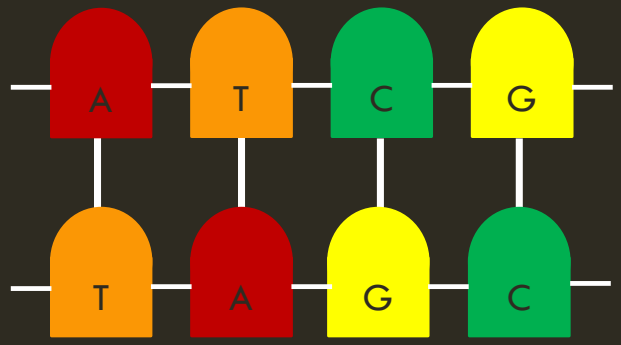




WHAT IS DNA?

Let's talk a little more about DNA structure and why we can use it as a **tool to find the cause of disease**!

DNA is a set of four parts or molecules.
A unique combination of these molecules make up the instructions for building an organism.

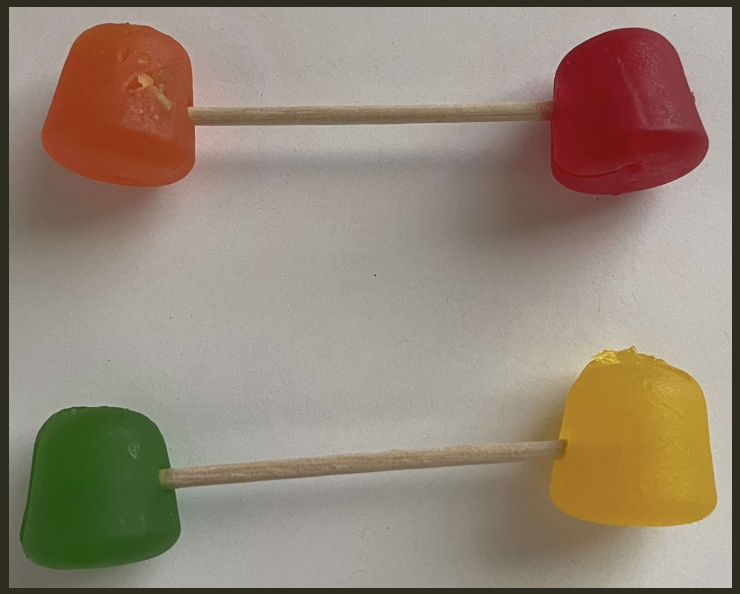


These molecules form a pair with a **complimentary** molecule! **A always goes with T. C always goes with G.**

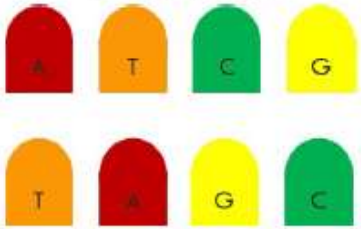
Scientists can use the unique sequence and complimentary pairing of DNA to **detect the presence of organisms in an environment.**

LET'S BUILD A MODEL DNA SEQUENCE!

See Instructions in Handout on Page 5



Color Key:



What you will need:

- ❑ 1 box of DOTS gumdrops
- ❑ 30 toothpicks
- ❑ 1 Plate

Step 1:

We're going to build a DNA model of the sequence: A T T C G T A C G C A A

Write the complimentary base pairs below the sequence _____

Step 2:

Use the color key above to connect the complimentary base pairs of the sequence. Similar to the picture on the right.

Step 3:

After all complimentary base pairs have been connected, use toothpicks to build the sequences.

Step 4:

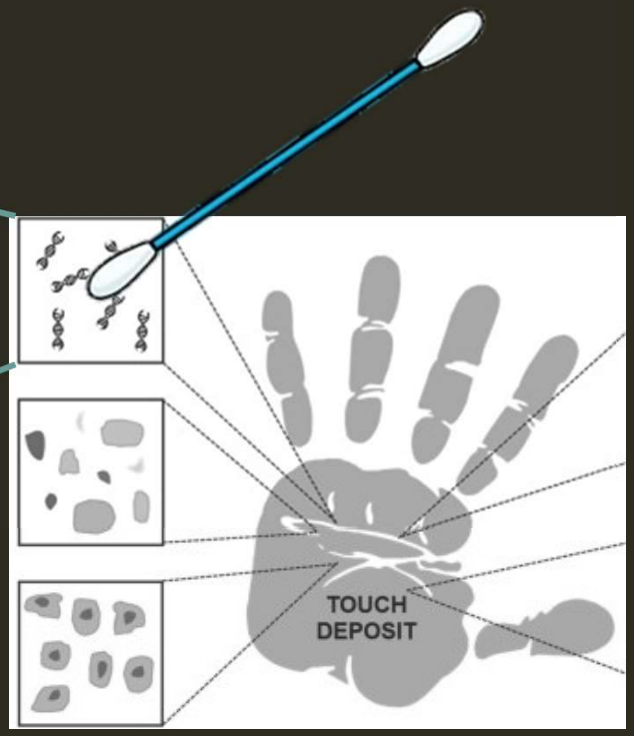
Twist the DNA to form the double helix

LETS COME BACK TOGETHER

Let's talk a bit more about how we can use the structure of DNA to solve biological mysteries.

And how we are going to design an experiment to find the cause of the sea star sickness.

RECALL: ORGANISMS LEAVE DNA BEHIND IN THEIR ENVIRONMENT



LET'S SAMPLE SOME DNA

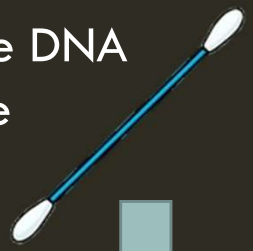
sick

healthy

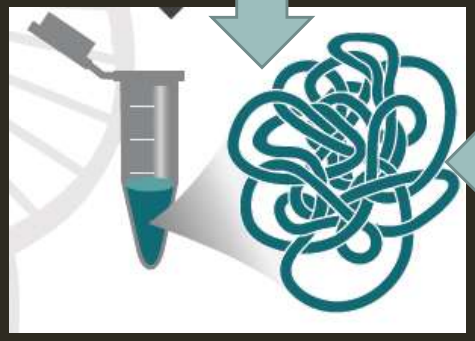
Photos from UCSC

NOW WE CAN SEQUENCE THE DNA IN THE LAB

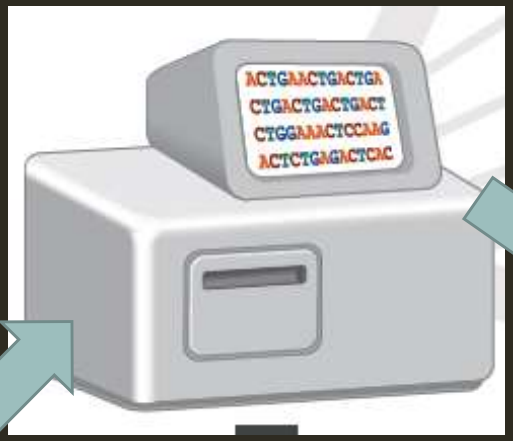
1. Take DNA sample



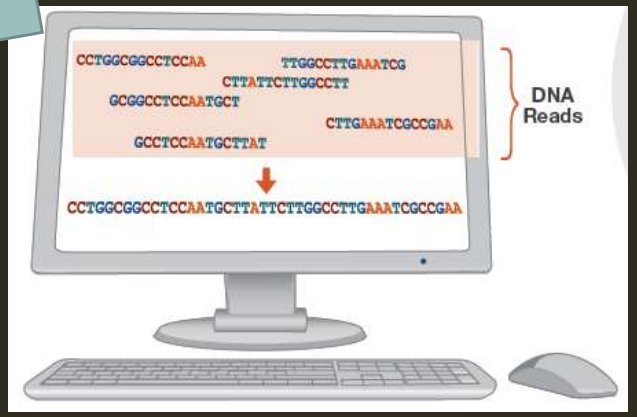
2. Isolate DNA



3. Sequencing



4. Compare DNA sequences



NOW LET'S COMPARE DNA SEQUENCES!

Go to Page 6 in your Handout

We have found that an **unknown** DNA has been found in much higher numbers in the sick sea star samples

This **unknown** DNA might belong to the organism that is the cause of the sea star sickness.

We will compare DNA sequences

And write down which ones match and which ones don't

NOW LETS COMPARE DNA SEQUENCES!

Step 1: Try pairing the unknown sequence with the 5 known sequences. Record the number matches and mismatches in the table below.

Organism	Matches	Mismatches
 Pacific Purple Sea Urchin		
 Giant Green Anemone		
 California Mussel		
 Giant Kelp		
 Densovirus		

RECAP: WHAT DID WE DO TODAY?

We learned that DNA is made up of molecules (A, T, C, and G) and they form complimentary pairs

We learned the structure of DNA allows us the compare sequences between organisms.

We also learned that we can detect organisms in an environment because they leave DNA behind.

We solved the mystery of the sea star wasting disease and found the cause, a denso virus.

Today we know the virus is not a problem for sea stars and their populations are recovering, but we also know that as the climate warms it could become a problem again. Check the website in the handout for a place to record your citizen science observations of sea star health this helps sea stars by keeping track of sea star wasting disease.