

Spotting the Fake

In this activity you will be producing two identical replicas from one original DNA molecule through the DNA replication process. UL uses scientific methods, including procedures similar to this activity, to test the DNA of fish and determine whether a fish is authentic.

Which fish is the real Sea Bass?

In the video game, you performed the three step process for identifying the origin of a tissue sample – Extraction, Amplification, and Identification. In this activity we are going to focus on the Amplification and Identification steps by replicating the fish’s DNA, and identifying it to see if the DNA matches up with the authentic Sea Bass DNA.

Materials

- Sheet of construction paper
- Scissors
- Glue
- DNA Template Sheet

Word Bank

DNA – (Deoxyribonucleic acid) DNA is unique to each individual and contains the information to determine the characteristics of living things.

Replication – the process of copying a double stranded DNA Parent –
Nucleotides – a group of molecules that, when linked together, form the building blocks of DNA. Made up of a sugar, a phosphate, and a nitrogenous group.

Double Helix – the shape that DNA forms, like a curved ladder.

UL – a safety certification company that tests and evaluates products and materials to ensure a safer world.

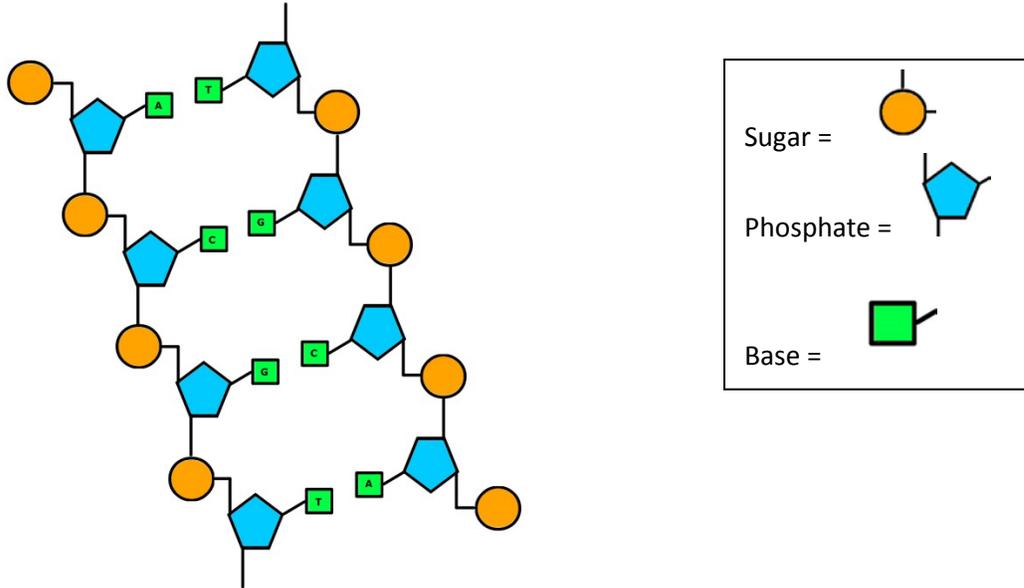
Counterfeit – to make an imitation product that is misrepresented as an original or authentic good.

DNA Replication Process

DNA is made of two strands that wrap around each other like a curved ladder, a double helix.



Although it may look complicated, the DNA in a cell is really just a pattern made up of nucleotides. Each nucleotide consists of a sugar, bound to a phosphate group and a nitrogenous base. The sugar and phosphate form the sides of the ladder, while the bases form what look like the steps of the ladder.



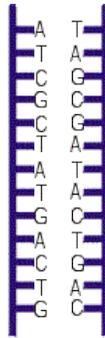
Imagine an alphabet that only has four letters: there are four nitrogen bases in DNA's alphabet. DNA has a long string of these letters, and this string of letters is different for each individual.

The four bases are:

- adenine (A)
- guanine (G)
- cytosine (C)
- thymine (T)

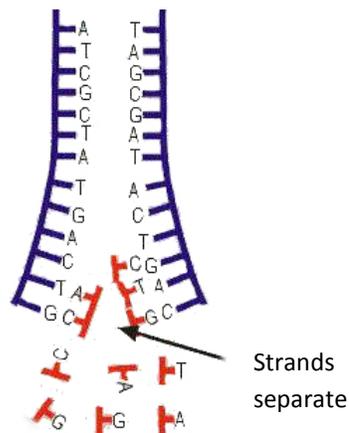
The bases of one strand always match up with bases on the other strand.

'C' is complementary to and always pairs with 'G'
'A' is complementary to and always pairs with 'T'

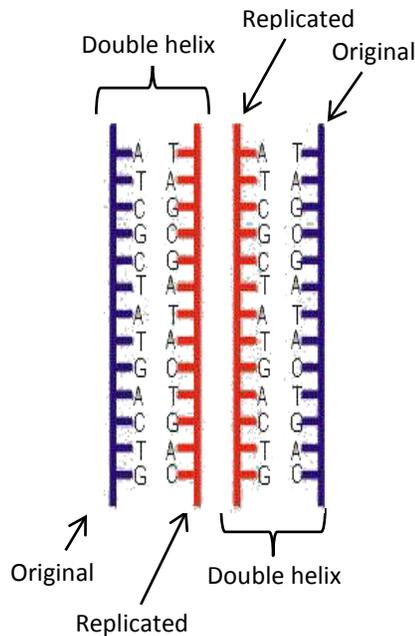


Two strands of DNA

During replication an identical copy of the original DNA is made. The original DNA splits in half resulting in two separate strands. This is just like unzipping the zipper on your jacket; it leaves two halves that once perfectly fit together. Each of those strands provides a template for individual bases to come in and pair to.



The individual bases match up with their complementary base on the original DNA strand, and come together to create a new strand. When replication is complete, there will be two identical DNA double helices. Each double helix will have one strand from the parent DNA and one newly synthesized strand.



Activity

1. Using the DNA/Bases Template Sheet cut out the parent DNA template strands.
2. Cut out the single bases.
3. Glue one of the original DNA template strands to the construction paper.
4. Match up the single DNA bases with their complementary bases on the parent DNA strand so that they fit together (like puzzle pieces) to create a new double helix.
5. Glue the other original DNA template (next to the first one) to the construction paper.
6. Match up the remaining single DNA bases with their complementary DNA bases on the parent DNA strand.
7. Label the parent DNA strands with their correct base letter. (Hint: 'C' always pairs with 'G' and 'A' always pairs with 'T')

Results

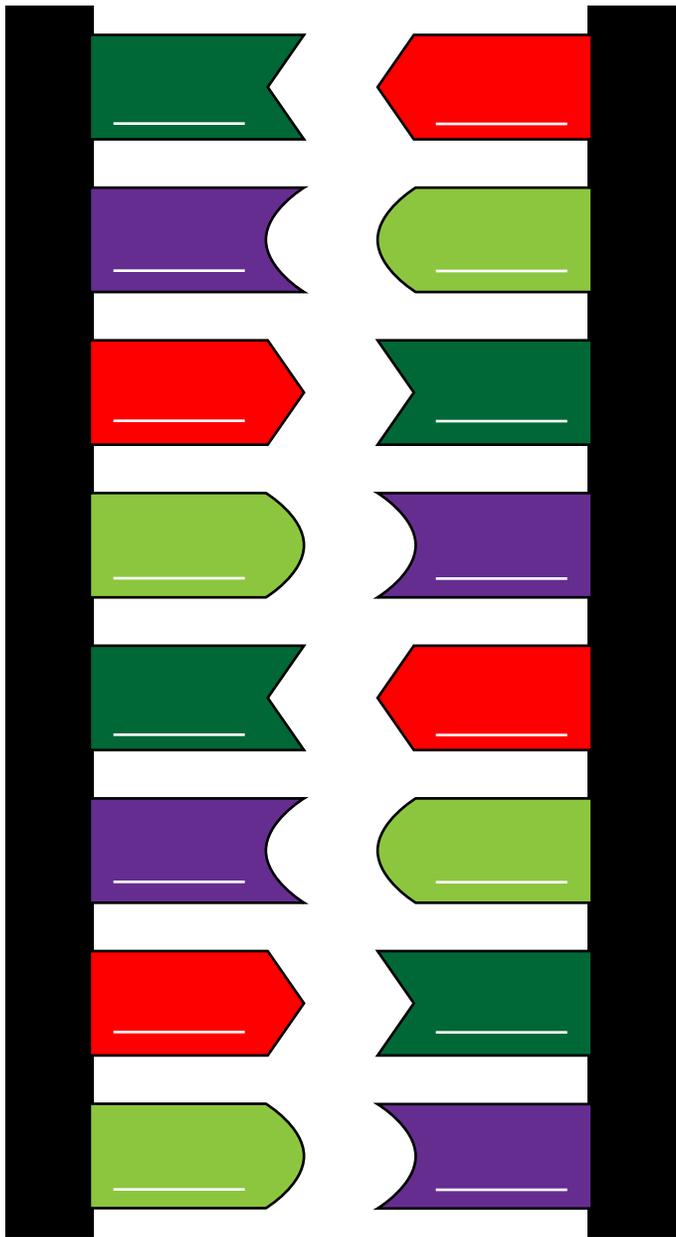
You now have your replicated DNA strand!

Authentic Sea Bass DNA is : GAACTCACG

Does yours match up with the authentic Sea Bass DNA?

DNA/Bases Template Sheet

Parent DNA template strands



Single bases

