# Genetic Code Bracelets/Keychains

DNA is built in a structure called a double helix—it looks like a ladder that is twisted into a spiral. Each rung of the DNA ladder is made up of one of four basic building blocks: adenine (**A**), thymine (**T**), cytosine (**C**), and guanine (**G**). Each building block is like a puzzle piece that connects one with another. Adenine and thymine connect together, and cytosine and guanine connect together. These connections are called complementary base pairs.

Choose an animal and use its traits to make a bead bracelet model of their DNA.

You'll need:

- Paper
- Pencil
- String, about 4-feet long
- Beads (or, see instructions on how to make your own paper beads)
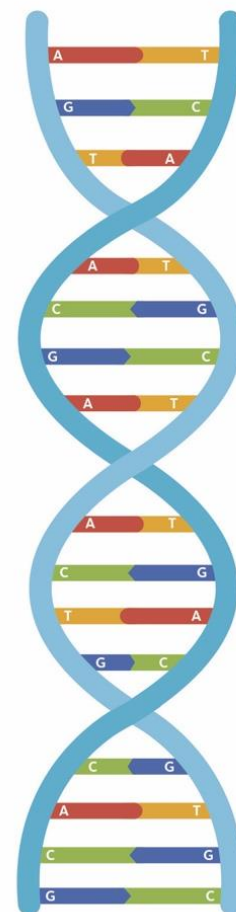
What to do:

1. Select an animal from the chart.
2. Write down the DNA code.
3. Next to each letter base, write down the connecting base letter. **A** and **T** go together, and **C** and **G**. For example, the first four base letters for the King cobra are G, A, T, and C. The full code for these first four would be G=C, A=T, T=A, and C=G.
4. Choose a color for letter (A, T, C and G).
5. Line up beads following the code you wrote down.
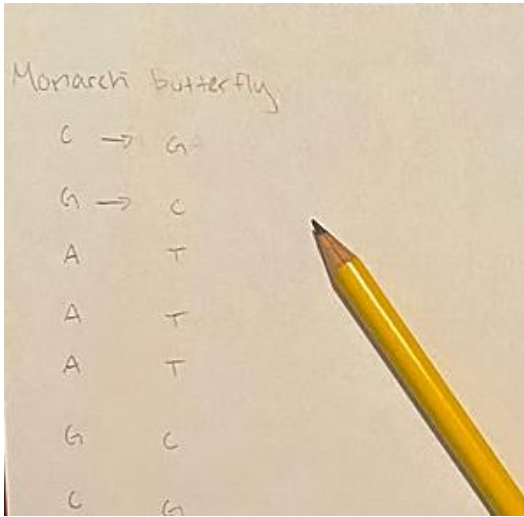
(step 3)
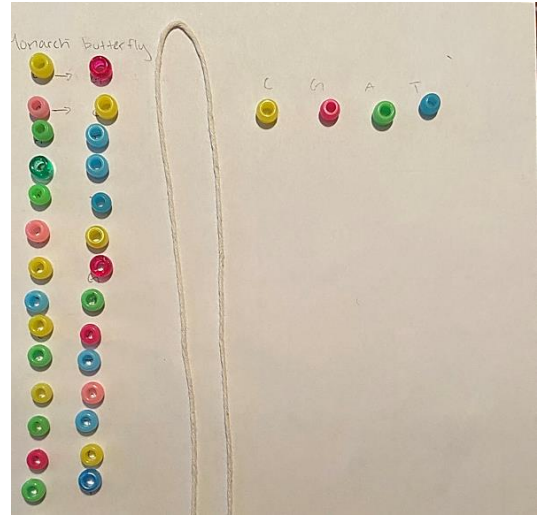
(step 5)

6. Fold the string in half so that the ends are touching at the bottom and there is a bend at the top.
7. Follow the pictures to tie a simple knot called an **overhand knot.**

8. Separate the strings and put each bead from the first base pair on the string, the base from the left column you wrote on the left string, and the partner base from the right column on the right string. Slide the beads to the top of the strings, close to the knot.
9. Thread the string on the right through the bead on the left, and thread the string on the left through the bead on the right.
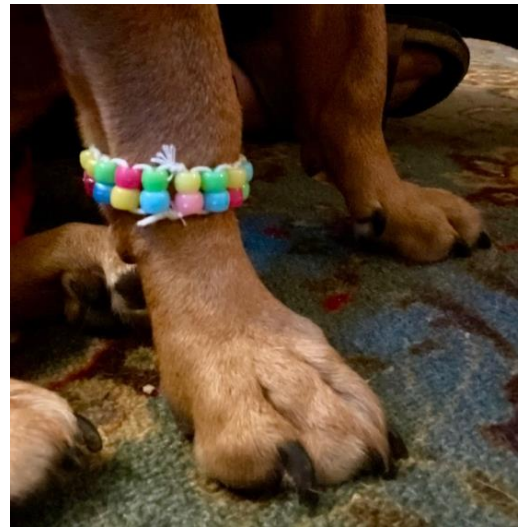10. Pull tight.
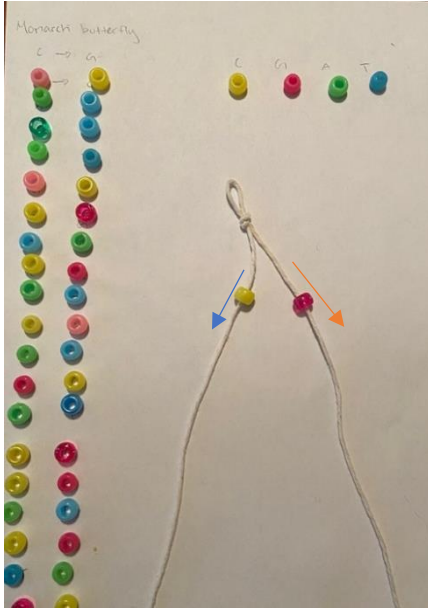
(step 8)

(step 9)
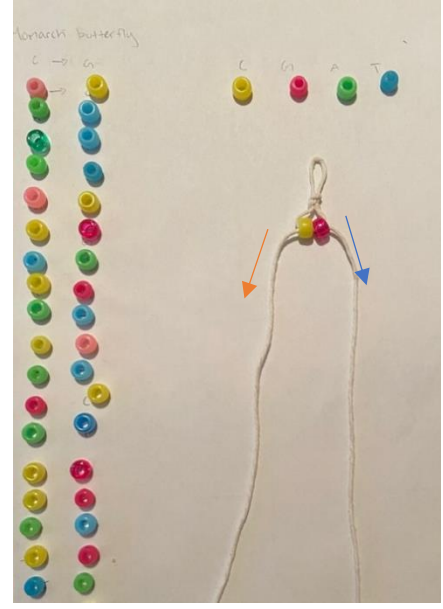
(step10)

11. Repeat with the rest of the beads
12. Tie another knot at the end to keep the beads in place.
13. Tie it around your wrist, put it on a keychain on your backpack, or give to a friend!

Animal chart

	Moon jelly (*Aurelia aurita*) T G G G G A C A T A A T C C C T A C G C
	Great white shark (*Carcharodon carcharias*) C C A T C A T C T A C G C G T C C C T G
	American bullfrog (*Lithobates catesbeianus*) T G T G G C T C C A G T T C A T G T A A
	King cobra (*Ophiophagus hannah*) G A T C T A G T G C T A T G G T G G T A
	Bald eagle (*Haliaeetus leucocephalus*) T A G T A A G C T C G T A C T G T G G T
	Human (*Homo sapiens*) A G A C G C G A C A C G G G T A G G A C
	Chimpanzee (*Pan troglodytes*) C A T C A G T A A T A A G G A T A G T G
	Monarch butterfly (*Danaus plexippus*) C G A A A G C T C A C A G A C C A C T G

Challenge

Make up your own animal by selecting one trait from each of the categories and follow the steps 2-13 to make a DNA bracelet for your new animal. Think about these questions as you pick your traits.

- What environment would the animal live in?
- What type of predators might it have?
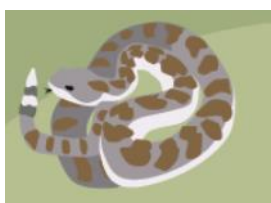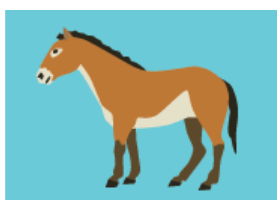- How do the traits that you chose help the animal to survive?

Trait Chart

What covers its body?

Fur	Scales	Feathers	Skin
G G A	C G T	C T T	A T T

How does it breathe?

Lungs	Gills
A G C	G T G

How does it move?

Slither (no legs)	Walk/run (legs)	Fly (wings)	Swim (fins)
T T C	C G A	T G G	A G A

What size is it?

Small	Medium	Large
C C G	A G G	G A T

What type of food does it eat?

Plants (herbivore)	Plants and meat (omnivore)	Meat (carnivore)
T A A	G G C	C A C

What type of skeleton does it have?

Vertebrate	Exoskeleton	No Skeleton
G G C	C T G	A A C

How does it reproduce or give birth?

Live birth	Lays eggs
T C G	A T T