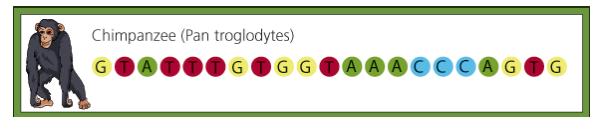


DNA Barcode Bracelets

You can make a bracelet that carries some of the code for an organism, such as a person, trout, chimpanzee or butterfly.

Just like in DNA, there are four different kinds of units that make up the sequence - red, green, yellow and blue. Your bracelet will contain two strands of beads that match up the same way the units (or bases) in DNA do. That means if you know the sequence of one strand, you can work out the sequence of the other.

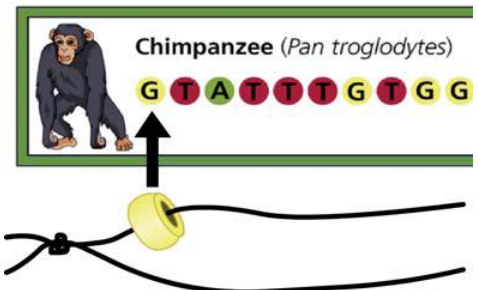


1. Choose one DNA sequence to make.

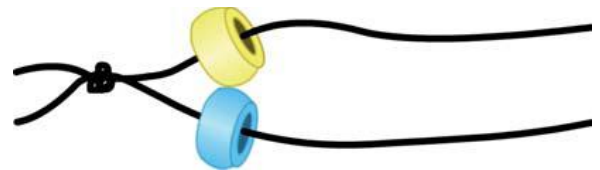


2. Use a length of string measured from your thumb to your elbow, and fold the string in half. Tie a knot which creates a loop in the middle of the string.

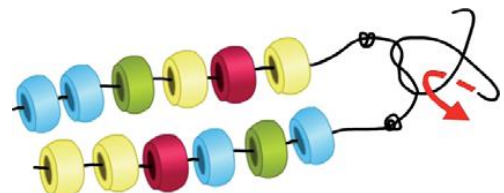
3. Look at the first letter in your sequence and find the right colour bead to thread.



4. Thread that bead onto string 1 and thread the bead for the matching base onto string 2 (see the Pairing Rules sheet for guidance). Keep threading beads according to your sequence until you've finished the sequence on your card.



5. Knot each string after the last bead, and then tie the two new knots together.



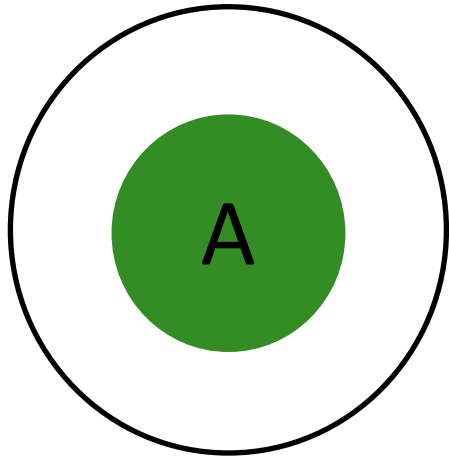
6. Now tie the ends of your double-stranded sequence bracelet together.



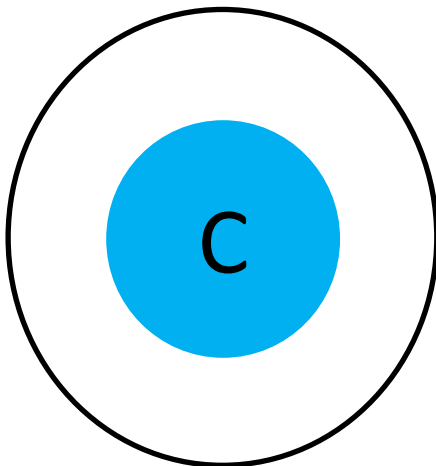
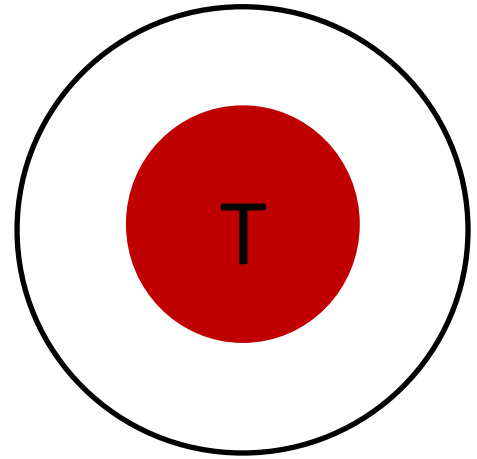
You've finished! Congratulations!

DNA Barcode Bracelets

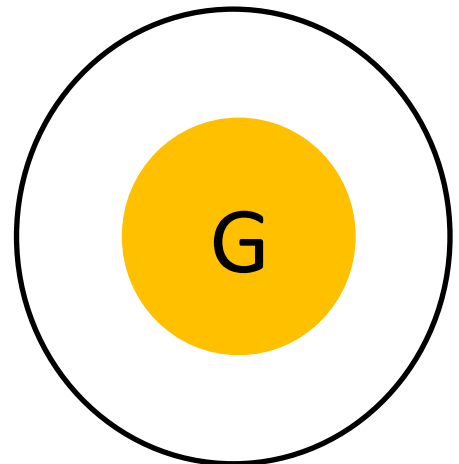
DNA Bases: Pairing Rules



Pairs with



Pairs with



DNA is made up of four units or 'bases', known as **A**, **C**, **T** and **G**.

Each of the bases binds with one partner: **A** with **T**; **C** with **G**.

Your sequence bracelet should obey the same rules: look in the circles above to work out which coloured beads you should use.

DNA Barcode Bracelets

Sequence Information



Chimpanzee (*Pan troglodytes*)

GTATTTGTGGTAAACCCAGTG

Sequence taken from the gene that codes for granulysin. Granulysin is a toxic protein that is released by immune cells in response to infection, to kill pathogens like bacteria.



Brown trout (*Salmo trutta*)

TACATCAGCACTAACTCAAGG

From trout mitochondrial DNA; variation in this sequence can be used to trace trout populations and evolution. Mitochondria are small energy factories within eukaryotic cells that have their own genome of about 16,000 base pairs.



Human (*Homo Sapiens*)

TCTGAGTTCTTACTTCGAAGG

Part of the *OCA2* gene sequence. The *OCA2* gene codes for a protein involved in pigmentation and variation in its sequence is a major influence on whether we have brown or blue eye colour.



Butterfly (*Danaus plexippus*)

ATGATCCCGACTATTACTATG

Sequence from a gene that codes for an 'opsin' protein. This particular opsin reacts to ultraviolet (UV) light, which the butterfly uses to navigate.



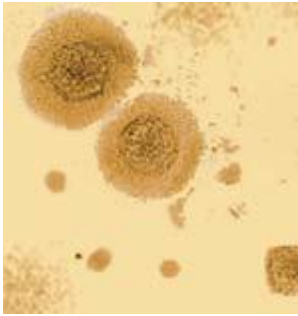
Malayan spitting cobra (*Naja sputatrix*)

AACCGACCGCTGCAACAACTG

Sequence from a gene that codes for a toxin protein. This toxin is a component of the cobra's venom, and blocks signals between the nerve and muscle cells of the cobra's prey, paralysing it.

DNA Barcode Bracelets

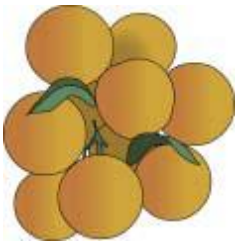
Sequence Information



Flesh-eating microbe (*Mycoplasma alligatoris*)

CAACAGTGTATTAGGTTACAC

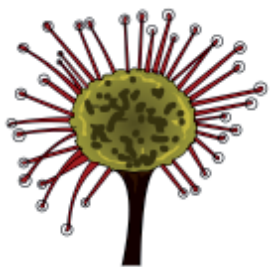
Part of the gene that codes for an enzyme called sialidase. When these bacteria infect an alligator they secrete sialidase to break-down the alligator's tissues, enabling them to spread through its body.



Sweet orange (*Citrus sinensis*)

TGCTACAGTTGCTGTTGTTGG

Sequence taken from the gene that codes for pectinesterase. Pectinesterase is an enzyme that helps to break down the cell walls of the orange when it ripens, making the flesh soft.



Carnivorous plant (*Drosera rotundifolia*)

GTAGCCACAGACTCAGTCATC

Part of a gene that codes for a chitinase enzyme. The plant secretes these enzymes to break down the chitin-rich body casing of any insect that gets trapped on its tentacles.



Giant Madagascar hissing cockroach

(*Gromphadorhina portentosa*)

GATTCGCCGCTATCAGAAGAG

From the gene that codes for histone 3. Histone 3 is one of eight histone proteins that combine to form nucleosomes, the bundles around which DNA is wrapped in the nucleus.



Corpse flower (*Amorphophallus titanum*)

TCGAACCCTTGTGGGGAGG

This sequence is from the gene that codes for ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCO), an enzyme that is involved in plant photosynthesis and respiration.



Chimpanzee (*Pan troglodytes*)

G T A T T T G T G G T A A A C C C A G T G



Brown trout (*Salmo trutta*)

T A C A T C A G C A C T A A C T C A A G G



Human (*Homo sapiens*)

T C T G A G T T C T T A C T T C G A A G G



Human (*Homo sapiens*)

T C T G A G T T C T T A C T T C G A A G G



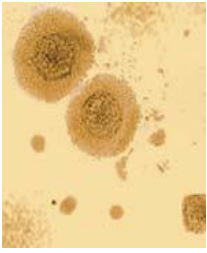
Butterfly (*Danaus plexippus*)

A T G A T C C C G A C T A T T A C T A T G



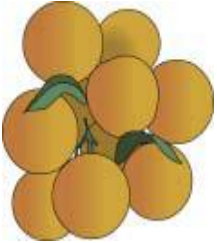
Malayan Spitting cobra (*Naja sputatrix*)

A A C C G A C C G C T G C A A C A A C T G



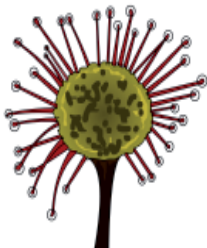
Flesh eating microbe (*Mycoplasma alligatoris*)

C A A C A G T G A T T T A G G T T A C A C



Sweet Orange (*Citrus sinensis*)

T G C T A C A G T T G C T G T T G T T G G



Carnivorous plant (*Drosera rotundifolia*)

G T A G C C A C A G A C T C A G T C A T C



Madagascar hissing cockroach (*Gromphadorhina portentosa*)

G A T T C G C C G C T A T C A G A A G A G



Corpse flower (*Amorphophallus titanum*)

T C G A A C C C G T T G T T G G G G A G G



House Mouse (*Mus musculus*)



A C C C T C T A T C T A C T A T T C G G A



Sharp-shinned Hawk (*Accipiter striatus*)



A T T A T A C T T A A T C T T T G G C G C



Eastern Gartersnake (*Thamnophis sirtalis sirtalis*)



A C C C T G T A C C T T C T G T T C G G G



Asian Lady Beetle (*Harmonia axyridis*)



A C A T T A T A C C T T T T A T T T G G A

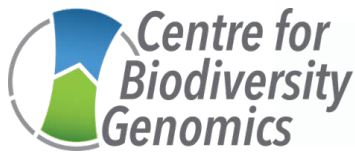


Sugar Maple (*Acer saccharum*)



T T T T C G A G A A C A A T T T C T C A C

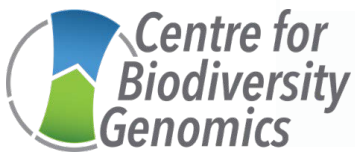
@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

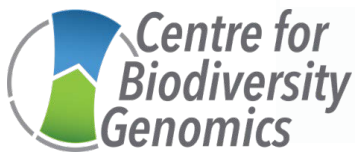
@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

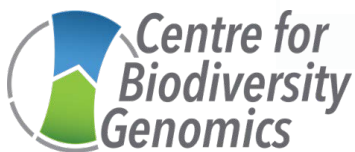
@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.



Red Fox (*Vulpes vulpes*)



A C T T T A T A T T T G C T A T T C G G A



Ghost Spider (*Anyphaena pectorosa*)



T A C T T T A T A T T T A A T T T T T G G



European Honey Bee (*Apis mellifera*)



G A T C T T G T A T A T T A T T C T A G C



Monarch Butterfly (*Danaus plexippus*)



A T G A T C C C G A C T A T T A C T A T G



Firefly (*Ellychnia corrusca*)



A A C A T T A T A T T T C A T T T T T G G

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

DNA Barcode Bracelets

Species Information



House Mouse (*Mus musculus*)



The House Mouse is a small rodent. It is one of the most numerous species of the genus *Mus*. Although a wild animal, the house mouse mainly lives associated with humans, causing damage to crops and stored food.



Sharp-shinned Hawk (*Accipiter striatus*)



The Sharp-shinned Hawk is a very small hawk. In fact, "sharp-shins" or "sharpies" (as they are sometimes casually called) are one of the smallest hawks to reside in Canada.



Eastern Garter Snake (*Thamnophis sirtalis sirtalis*)



The Eastern Garter Snake is an indigenous North American snake found widely across the continent. Most garter snakes have a pattern of yellow stripes on a brown or green background and their average length is about 22 inches.



Asian Multicoloured Lady Beetle (*Harmonia axyridis*)



The Asian Multicoloured Lady Beetle is native to eastern Asia, but has been introduced to North America and Europe to control aphids and scale insects. Its colour ranges from yellow-orange to black, and the number of spots between none and 22.



Sugar Maple (*Acer saccharum*)



The Sugar Maple is a species of maple native to the hardwood forests of northeastern North America, from Nova Scotia west to southern Ontario, and south to Georgia and Texas. Sugar maple is best known for its bright fall foliage and for being the primary source of maple syrup.

DNA Barcode Bracelets

Species Information



Red Fox (*Vulpes vulpes*)



The red fox is the largest of the true foxes and the most geographically spread member of the Carnivora, being distributed across the entire Northern Hemisphere from the Arctic Circle to North Africa, Central America and Asia.



Ghost Spider (*Anyphaena pectorosa*)



The Ghost Spider is from a common spider genus that is found from the United States to Brazil, including the West Indies. It can be found in foliage and in houses. It is useful in preying on insects like the citrus leafminer.



European Honey Bee (*Apis mellifera*)



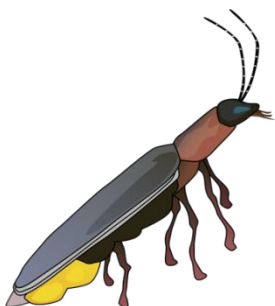
The European Honey Bee is native to the continents of Europe, Asia, and Africa. As of the early 1600s, the insect was introduced to North America, with subsequent introductions of other European subspecies two centuries later. Since then, they have spread throughout the Americas.



Monarch Butterfly (*Danaus plexippus*)



The Monarch Butterfly is perhaps the best known of all North American butterflies. Since the 19th century, it has been found in New Zealand, and in Australia since 1871, where it is called the wanderer.



Common Eastern Firefly (*Ellychnia corrugata*)

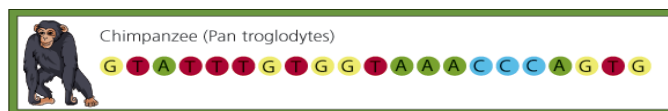


The Common Eastern Firefly is the most common species of firefly in North America. These fireflies are most noticeable around twilight, in the early part of the evening and hover close to the ground.

DNA Barcode Bracelets

You can make a bracelet that carries some of the code for an organism, such as a person, trout, chimpanzee or butterfly. Just like in DNA, there are four different kinds of units that make up the sequence - red, green, yellow and blue. Your bracelet will contain two strands of beads that match up the same way the units (or bases) in DNA do. That means if you know the sequence of one strand, you can work out the sequence of the other.

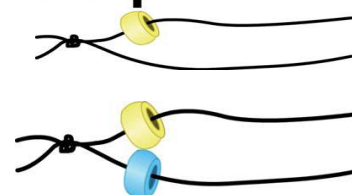
1. Choose one DNA sequence to make.



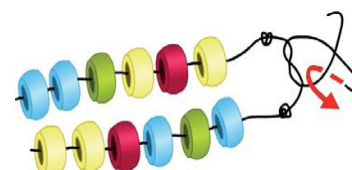
2. Look at the first letter in your sequence and find the right colour bead to thread.



3. Thread that bead onto string 1 and thread the bead for the matching base onto string 2 (see the Pairing Rules sheet for guidance). Keep threading beads according to your sequence until you've finished the sequence on your card.



4. Knot each string after the last bead, and then tie the two new knots together. Now tie the ends of your double-stranded sequence bracelet together.

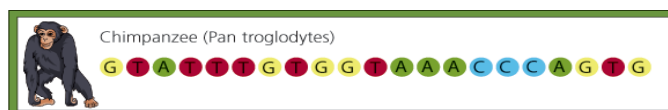


You've finished! Congratulations!

DNA Barcode Bracelets

You can make a bracelet that carries some of the code for an organism, such as a person, trout, chimpanzee or butterfly. Just like in DNA, there are four different kinds of units that make up the sequence - red, green, yellow and blue. Your bracelet will contain two strands of beads that match up the same way the units (or bases) in DNA do. That means if you know the sequence of one strand, you can work out the sequence of the other.

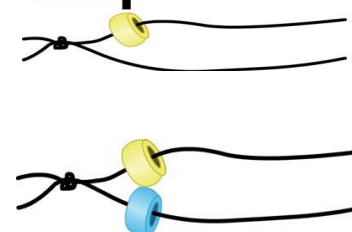
1. Choose one DNA sequence to make.



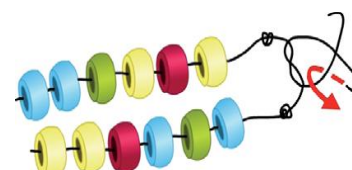
2. Look at the first letter in your sequence and find the right colour bead to thread.



3. Thread that bead onto string 1 and thread the bead for the matching base onto string 2 (see the Pairing Rules sheet for guidance). Keep threading beads according to your sequence until you've finished the sequence on your card.



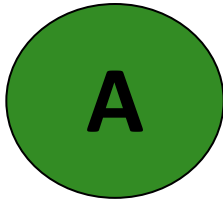
4. Knot each string after the last bead, and then tie the two new knots together. Now tie the ends of your double-stranded sequence bracelet together.



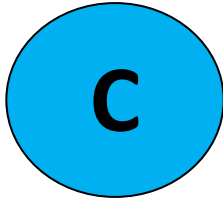
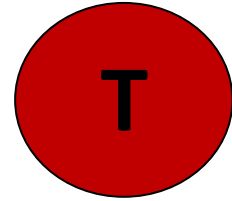
You've finished! Congratulations!

DNA Barcode Bracelets

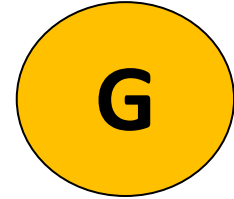
DNA Bases: Pairing Rules



Pairs With



Pairs With



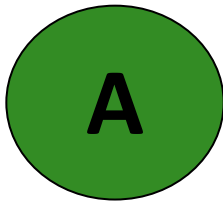
DNA is made up of four units or 'bases', known as A, C, T and G.

Each of the bases binds with one partner: A with T; C with G.

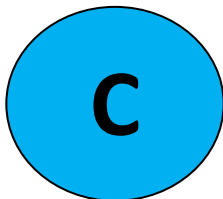
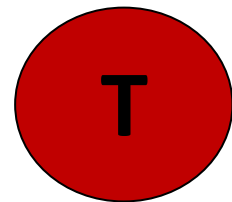
Your sequence bracelet should obey the same rules: look in the circles above to work out which coloured beads you should use.

DNA Barcode Bracelets

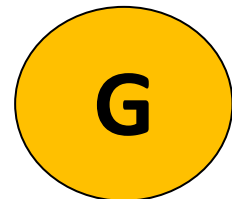
DNA Bases: Pairing Rules



Pairs With



Pairs With



DNA is made up of four units or 'bases', known as A, C, T and G.

Each of the bases binds with one partner: A with T; C with G.

Your sequence bracelet should obey the same rules: look in the circles above to work out which coloured beads you should use.



Sugar Maple (*Acer saccharum*)



TTTTCGAGAACAAATTTCTCAC



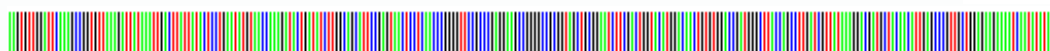
Sugar Maple (*Acer saccharum*)



TTTTCGAGAACAAATTTCTCAC



Sugar Maple (*Acer saccharum*)



TTTTCGAGAACAAATTTCTCAC



Sugar Maple (*Acer saccharum*)



TTTTCGAGAACAAATTTCTCAC



Sugar Maple (*Acer saccharum*)



TTTTCGAGAACAAATTTCTCAC

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.

@bugquest_canada



What is a DNA Barcode?

DNA barcodes are unique genetic signatures that can be used just like barcodes on consumer products, but to identify species. DNA barcoding requires only a tiny piece of tissue, because DNA is found in every cell of every organism. This technique allows us to identify species from all life stages and in all forms.