

Asexual Reproduction



DNA

All living organisms must reproduce in order for their species to survive. Before we can discuss the different types of reproduction, we must first understand how hereditary material, called DNA, plays a part.

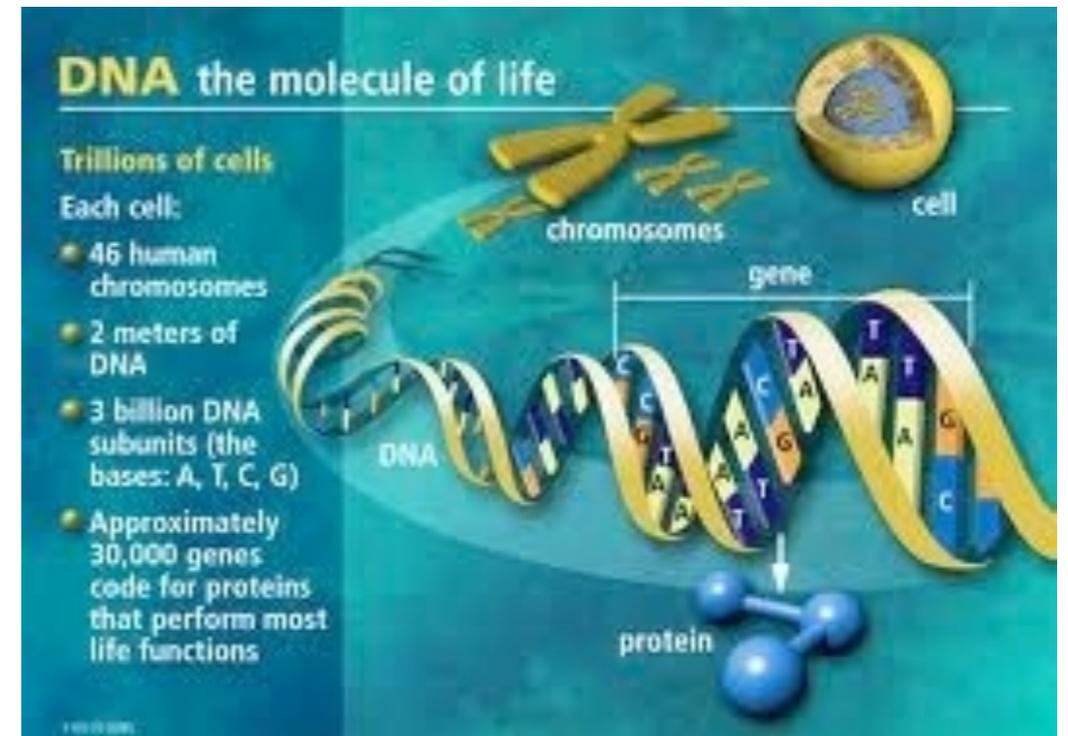


DNA

GOALS

1. Explain what DNA stands for.
2. Explain where DNA is located.
3. Describe the functions of DNA.

Well, I guess the first place to start is what exactly does DNA stand for? DNA stands for **deoxyribonucleic acid**.

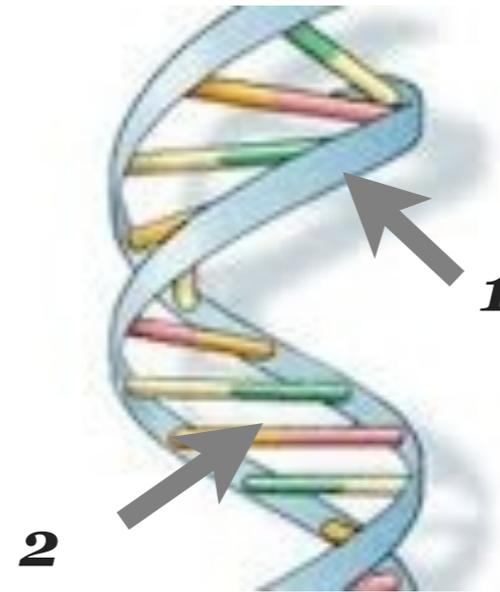


Looking at the diagram above, notice where DNA is located. Chromosomes are found inside the nucleus of cells. The chromosomes are made up of DNA.

Remember, that every living organism reproduces. How do your cells, as a human, know what you are supposed to look like and how you are supposed to function? Simple, it is all in the DNA.

DNA controls how the offspring will look and function. Everything about you, such as your eye color, hair color, the shape of your nose, is controlled by the DNA. It is not just how you look. DNA controls how your body works, as well. How fast your stomach digests its food is controlled by DNA. Your immune system fights off bacteria, viruses, etc and that, too, is controlled by DNA. Every single thing about YOU is controlled by DNA. Every single thing about your dog is controlled by DNA. Does it have short hair, long hair, floppy ears, lay down ears? Every thing about a red ant is controlled by DNA. Every thing about a single-celled bacteria is controlled by DNA. Every thing about a tree is controlled by DNA. How tall will the tree grow? How many leaves will it have? Will it bear fruit? Will the leaves be opposite on the stem or will it alternate? Every single thing about every single living organism is controlled by DNA.

So, since DNA is so important, we need to understand what it looks like and how it works.



DNA looks like a twisted ladder where the two sides (1) form the backbone that support the rungs. Each rung is made up of a pair of chemicals called bases (2).

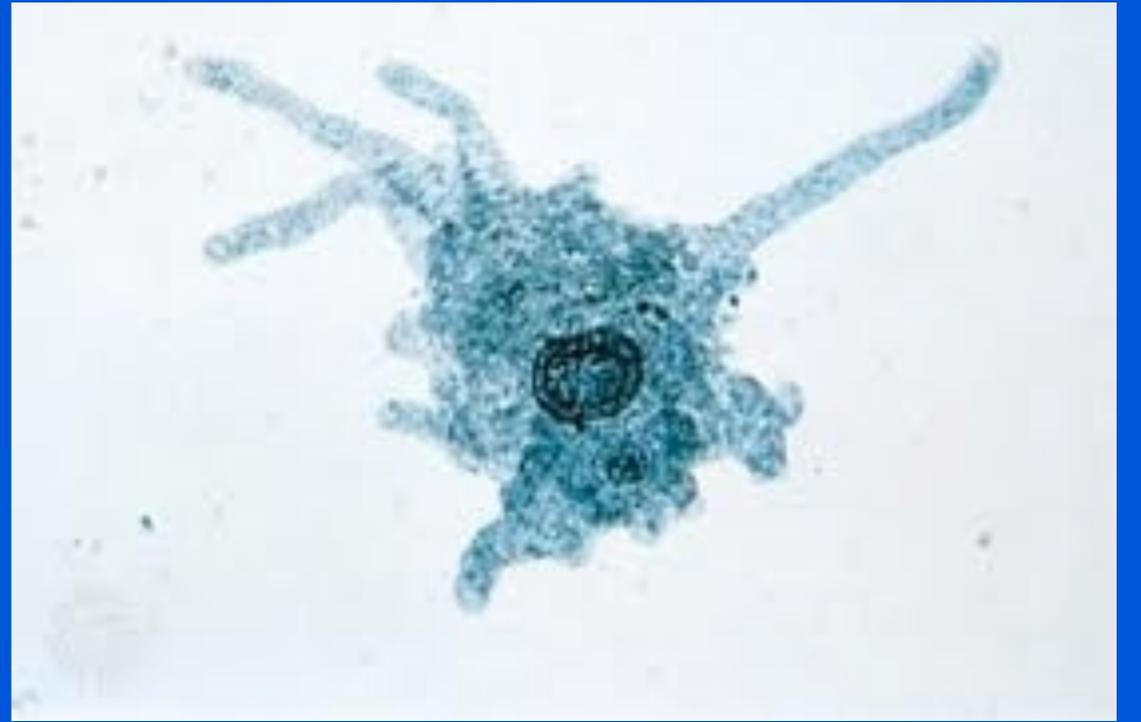
It is the rungs that hold all of the genetic information. There are only 4 bases in DNA, and they pair up very specifically. The 4 bases are Adenine, Guanine, Thymine, and Cytosine. Let's

look at the diagram above. Notice that the yellow base only pairs up with the green base, and the red base only pairs up with the orange base. Do you see any pattern to how the base pairs are arranged on the DNA molecule? There are not any set patterns because the base pairs could be arranged in so many different combinations. The secret of DNA has to do with the order or sequence of bases along the DNA ladder. The sequence forms a code, and when the code is read, the cell now knows what to do and how to do it. The many different codes is what gives us the different shades of blonde hair or the different shades of green in plants or the amount of fruit a plant produces.

Whew! Now, that we have a little better understanding of DNA, let's look at the first type of reproduction.

Asexual Reproduction

All living organisms must reproduce in order for their species to survive. But, do all living organisms reproduce in the same way? No, asexual reproduction is one way organisms can reproduce. Let's check it out.



What is Asexual Reproduction?

GOALS

1. Explain asexual reproduction.
2. Identify the different types of asexual reproduction.
3. Compare and contrast the different types of asexual reproduction.

Asexual reproduction is reproduction in which a new organism is produced from a part of another organism by cell division. All of the DNA in the new organism comes from one parent organism. Since the DNA comes from just one parent organism, the offspring will have identical DNA. So, what exactly does all of that mean? Maybe we should investigate the different types of asexual reproduction to get a better idea.

The first type of asexual reproduction is one that we are already familiar with. Single-celled organisms, such as bacteria, reproduce asexually through the process of **cell division**. One bacteria will go through the process



of mitosis, divide in half, forming two new bacteria each with identical DNA to the original bacteria. All single-celled organisms will go through cell division (mitosis) to reproduce asexually. Are single-celled organisms the only ones that reproduce asexually? No, let's look at some other ways organisms reproduce asexually.

Regeneration is another type of asexual reproduction. **Regeneration** is the process where organisms are able to replace body parts that been lost due to injury.



What happens when a sea star loses one of its arms? It grows a new one. What about when a chameleon loses its tail? It grows a new one. These are examples of regeneration. The missing limbs (arm, tail) grow back with the identical DNA as before. How many parent organisms were involved in this process of regeneration? Only one parent was involved, there-

fore, the DNA of the arm on the sea star and the tail of the chameleon will be identical to the arm and tail as it was before.

Another type of asexual reproduction is called budding. **Budding** is the process where a new organism grows on it. A good example of budding is a hydra shown below.



The parent hydra will begin to grow a tiny bud shown in the pictures above on the bottom left. The new bud will grow with the same shape and characteristics as the parent hydra. When the bud matures, it will break off and live on its own. It is now a parent hydra and can grow buds. The bud came from one parent organism so the the DNA of the new bud is identical to the parent organism.

The next type of asexual reproduction is cloning. **Cloning** is making a copy of an organism. When you hear the word cloning, you probably think of science fiction movies where zombies are cloned to ravage the world. Well, that is not exactly what we are talking about here.

Currently, the most common cloning is used by gardeners.



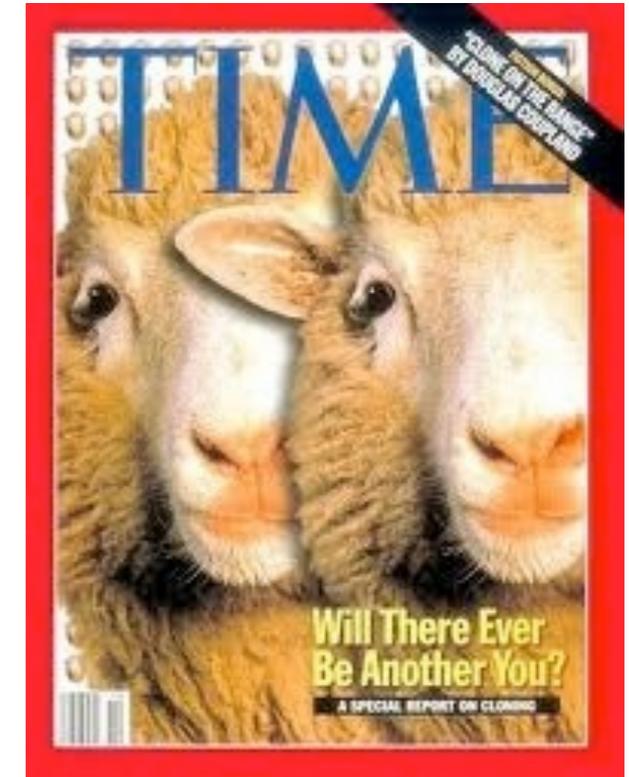
They use a plant's stems, leaves, or roots to clone the plant. Basically, here is how it works. Gardeners will cut off a piece of a plant. They will put the piece of the plant in water to

stimulate root growth. Fairly quick, roots will start to grow. When there is a good root system, the plant is then planted, and wa-la, a new plant! The plant is a clone because the new plant is identical to the original plant. Gardeners can grow many plants from just one.

There has only been one successfully cloned mammal. She was a Finn Dorset sheep named Dolly. Dolly was born in 1996 and was six years old when she was put to sleep due to progressive lung cancer.

The real value of Dolly was not that scientists could say that they were able to clone an animal. The real value of Dolly was that they now had a better understanding of how cells reproduce.

Look at the caption on the magazine. Do you think that will ever come true?



The videos below have more information.

- <http://youtu.be/txr8-oRaD-A>
- <http://youtu.be/39BbcZVCx8I>
- <http://youtu.be/CkZV7hl-kXE>

Review

Practice Questions



REVIEW 3.1

Asexual reproduction is

- A.** one parent and different offspring
- B.** two parents and identical offspring
- C.** one parent and identical offspring
- D.** none of the above

Check Answer

REVIEW 3.2

Offspring produced from growing from the parent organism is

- A.** regeneration
- B.** budding
- C.** mitosis
- D.** none of the above

Check Answer

REVIEW 3.3

The rungs of the DNA are called bases and hold the

- A.** answer to life
- B.** genetic information
- C.** traits
- D.** none of the above

Check Answer

REVIEW 3.4

DNA

- A.** controls how the organism will look and function
- B.** determines the organism's traits
- C.** makes up chromosomes and is located inside the nucleus
- D.** all of the above

Check Answer