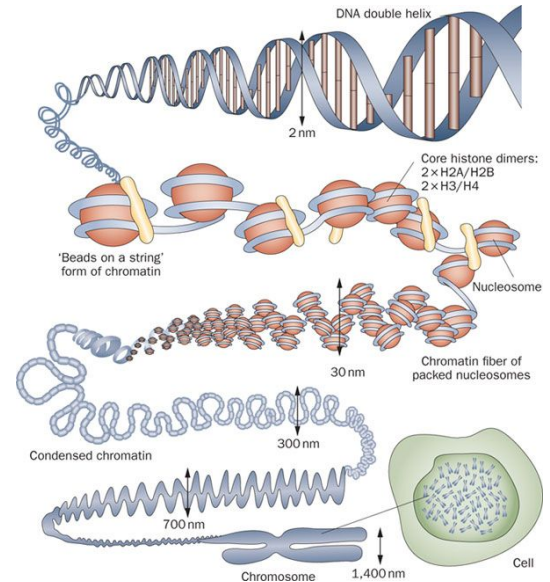


DNA Unraveled Lesson Plan - 4th Graders

Concepts:

1. Deoxyribonucleic acid (DNA) is present in all living things.
2. DNA provides the “blueprint” for life
3. DNA has a sugar phosphate backbone that strings together nitrogenous bases. There are just four different individual bases, but those bases can be combined in a near infinite number of combinations to build the diversity of life
4. DNA is packed into small cells by being wound up on nucleosomes, but we can get it out and unwind it. Nucleosomes function like yo-yos, winding up the DNA.
5. We can extract DNA from living things using everyday items like salt and soap.



Tonna *et al.* 2010 Nature

Competencies:

1. Follow a protocol
2. Form a hypothesis and evaluate results
3. Collaborate in a group to solve a problem

Outcomes:

1. An understanding of concepts 1-5.
2. A chance to practice competencies 1-3.
3. Increased engagement in biology and enthusiasm for science

1. What is DNA? (10 Minutes)

- a. DNA definition- **D**eoxyribo**N**ucleic **A**cid (write it on the board)
- b. What does it do?
 - i. Blueprints- How many of you build with Legos? Lego Analogy – blueprints for the things cells need to work
- c. What does it look like?
 - i. Two strings bound together and twisted --- looks like a rubber ladder! Bring in model or pictures.
- d. How does it work?
 - i. DNA has four building blocks **A, C, T, G** – but they go together in many combinations
 - ii. How many different things can you build with just four types of blocks?
- e. What has DNA? All living things.
 - i. Interactive Q&A
 1. Frogs, cats, worms, bacteria, crystals, peanut butter
 - ii. Is there DNA in your food? Of course!
- f. How does DNA fit in our cells?
 - i. DNA is really small and cells are really small but you have >6 ft. of DNA in each of your cells. How do you get it all in there?
 1. Spool it up (spool of thread or yo-yo)

2. Brainstorming/ Forming Hypotheses (5 Minutes)

- a. **Today we are going to get the DNA out of the cells. How are we going to get the DNA out?**
 - i. Brainstorm with students
 1. *Soap plus mashing to break open cells*
 2. *Salt breaks up proteins*
 3. *Alcohol separates the DNA from everything else!*
- b. **Hypothesis: Will we be able to see the DNA? How big will it be?**
 - i. We are going to use the power of strawberries---they have 4 times the amount of DNA molecules so they have a lot of DNA per cell.
 - ii. Have students draw the size they think it will be on the plate.

3. Extractions – break into groups of 4-6 students (15 mins)

- a. Explain the process (salt does x, soap does y)
- b. Let each child participate in some way
- c. Check off the protocol
- d. Troubleshoot with each child after they are done
- e. Dry out DNA on plate and circle it

4. Discussion (5 min)

- a. Ask about the result? Was their hypothesis supported?
- b. Why extract DNA? What do scientists do with it?
- c. What can we learn from DNA?
- d. What happens if the blueprints change? Discuss mutations and how that introduces changes
- e. **Open for all questions**

5. Closing Activity – Worksheets (10 mins)