

“The amazing challenge of Dr. Tom Bishop’s Project!”

Problem: How can I present the DNA Maker and Chromatin Folding on Bishop’s Theoretical Molecular Biology Lab webpage in a way that is usable by middle and high school students?

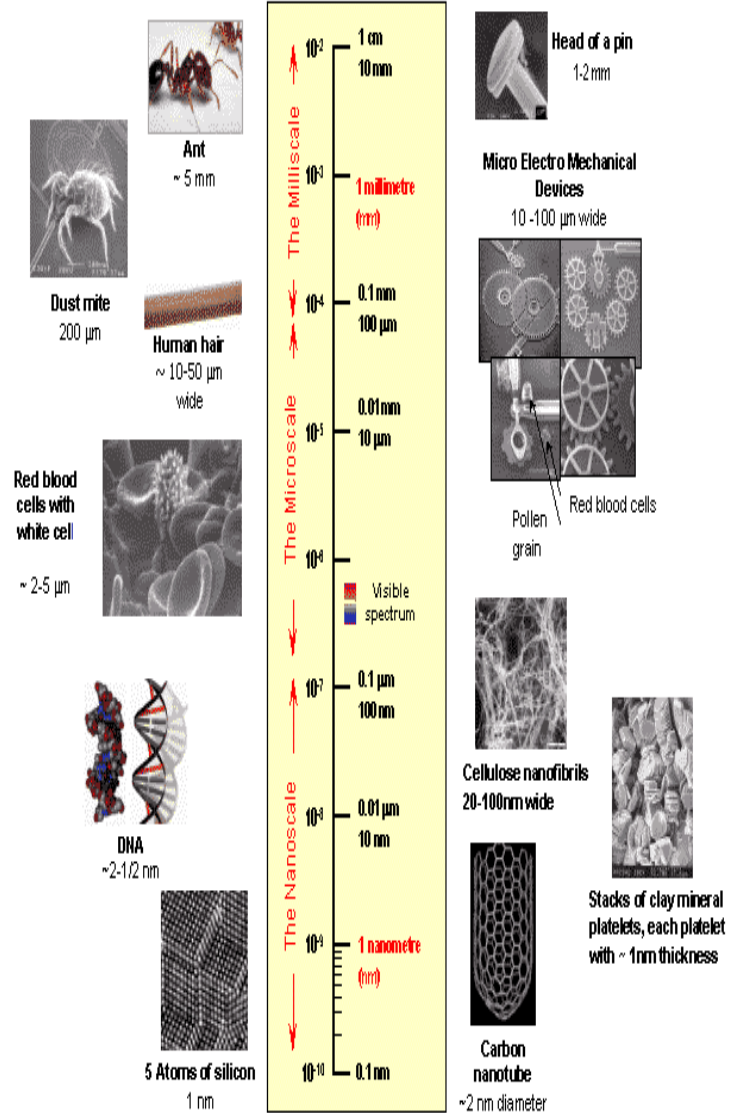
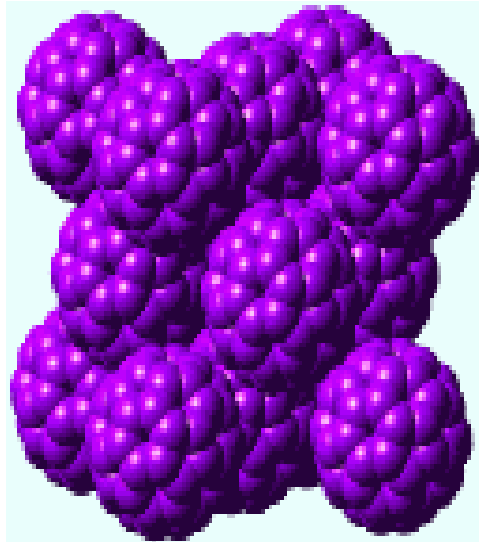


**Bishop's Theoretical Molecular
Biology Lab**

**RET PRESENTATION BY:
MARY BETH MCCOY
JULY 2012**



- <http://www.youtube.com/watch?v=rcWfH0jiQ4Q>



What is DNA and How does it Work?

This movie will show you the basic concepts of DNA and how it works.

Great review for 6-12th graders!

http://www.youtube.com/watch?feature=iv&annotation_id=annotation_998644&v=f6T0puolr9g&src_vid=hnSPGlpZx_Q

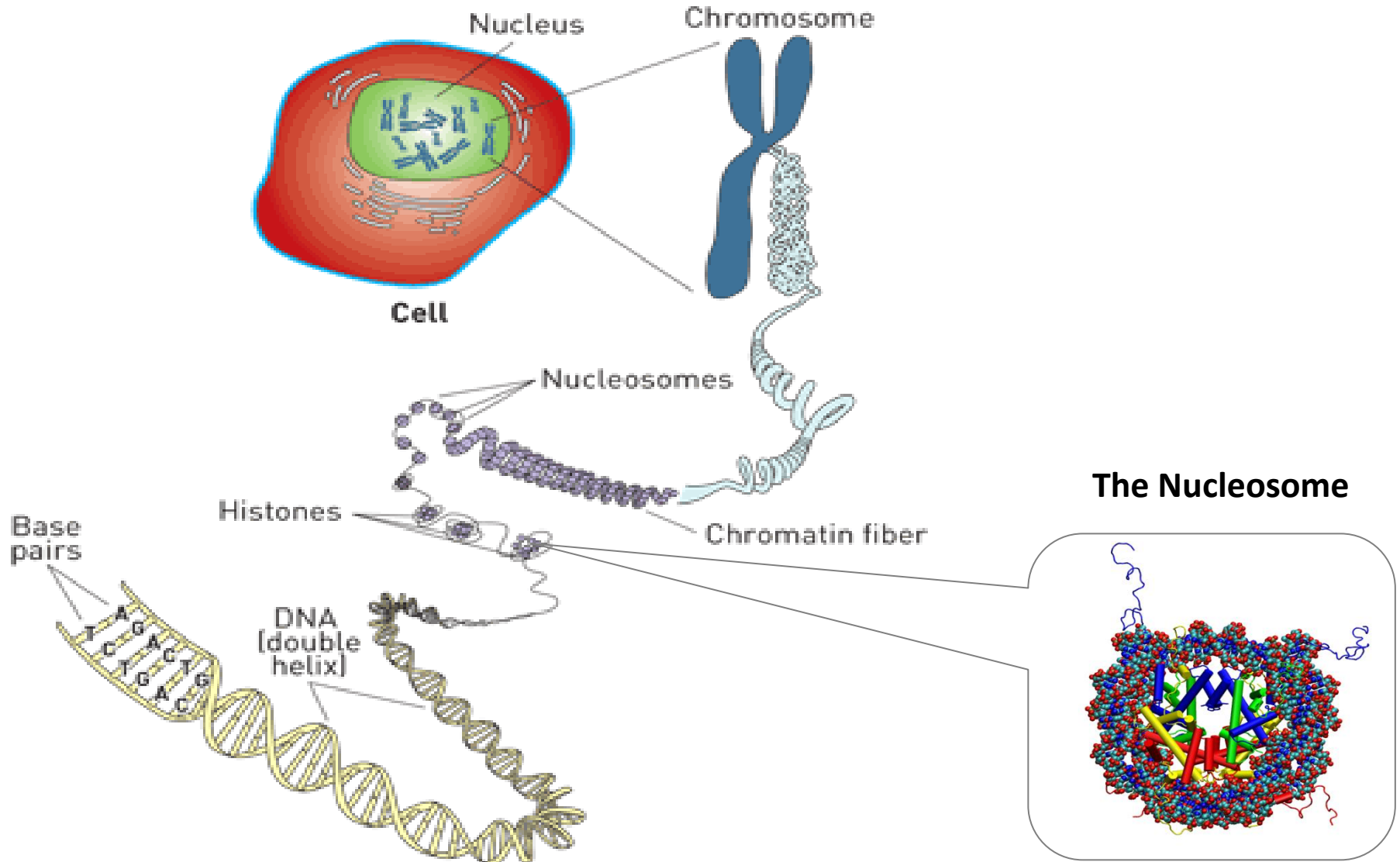


**Observation of irregular, kinky, and
asymmetric tendencies in the
molecular dynamics simulations of
the nucleosome.**

Thomas C. Bishop

LONI Associate Professor
Louisiana Tech University
Ruston, LA

Biology 101 and the Nucleosome

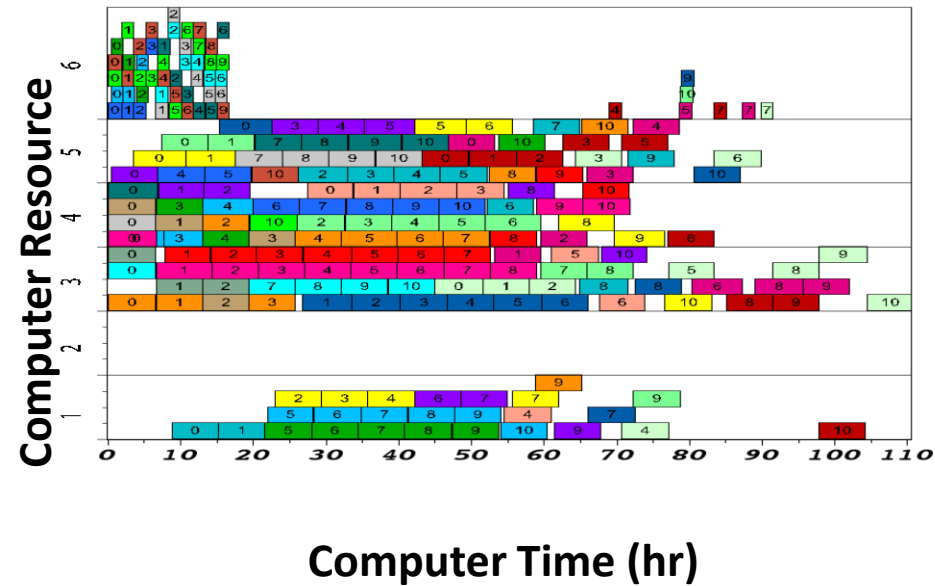
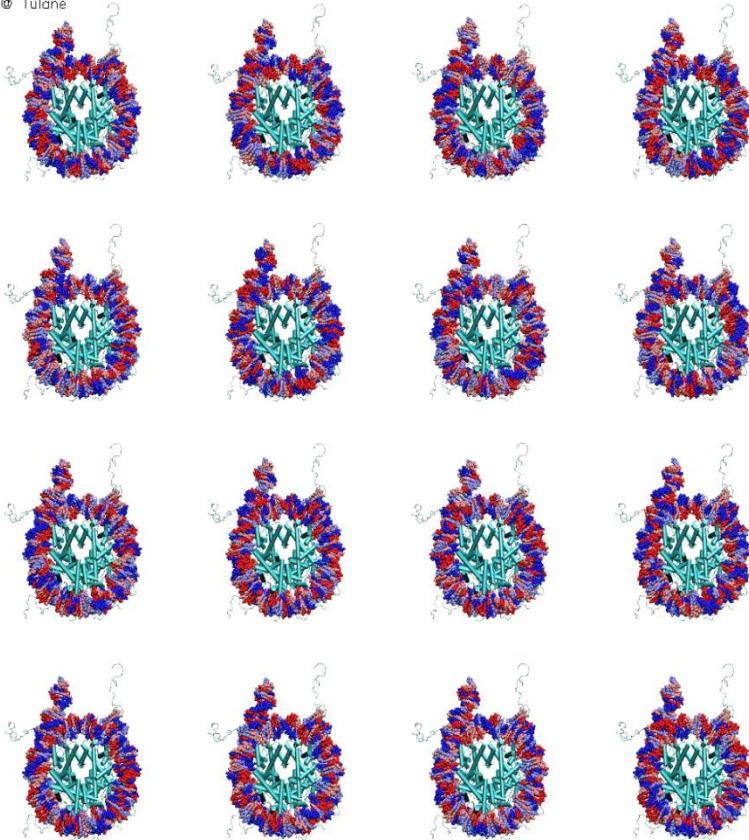


What in the world are the pictures and what was Dr Bishop talking about Monday?

- The first slide shows how DNA is folded by histone proteins into nucleosomes that clump together to form chromatin that then folds again and again ... ultimately forming the highly condensed "X" like the structure that folks often think of for chromosomes. However, for most of the cell cycle the genome is packed into chromatin, the fiber like structure containing just nucleosomes.
-

Many Nucleosomes = Many Simulations

Bishop 2010 © Tulane

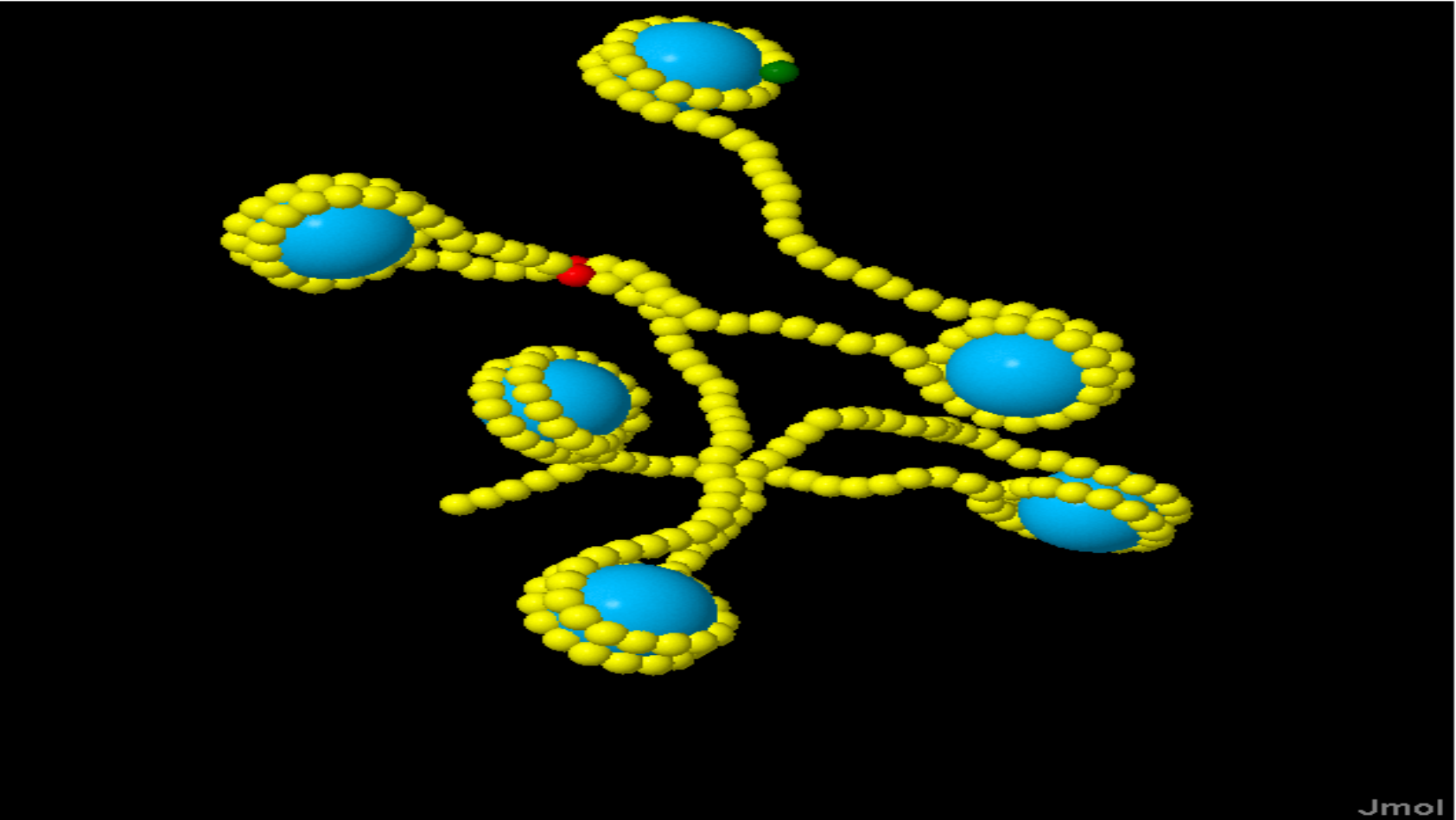


- So what is Dr Bishop's research is all about? He studies nucleosomes in silico (on the computer) and can look at about 16 nucleosomes at one time on the computer in atomic detail... Each simulation of a nucleosome takes **128** computers working together (like brick layers working on a house) about 8-10hrs of time to simulate 1 nanosecond (1 billionth of a second) in the life of a nucleosome. As you can image not a lot happens in 1 nanosecond. So he runs them typically for 20ns... Not a lot happens in 20ns but he hopes that this is sufficient to study the differences between nucleosomes that are made with diff. sequences of DNA.

In short he use **A LOT** of computer time to study a few billionths of a second in the life of several hundred nucleosomes. since we know the position of every atom in our simulations we can obtain a very detailed investigation of how the individual atoms in DNA behave and affect the structure and dynamics of DNA, nucleosomes and chromatin.

Bishop Lab - - Windows Internet Explorer

<http://dna.engr.latech.edu/icm/sessions/7469/chromatin.html>

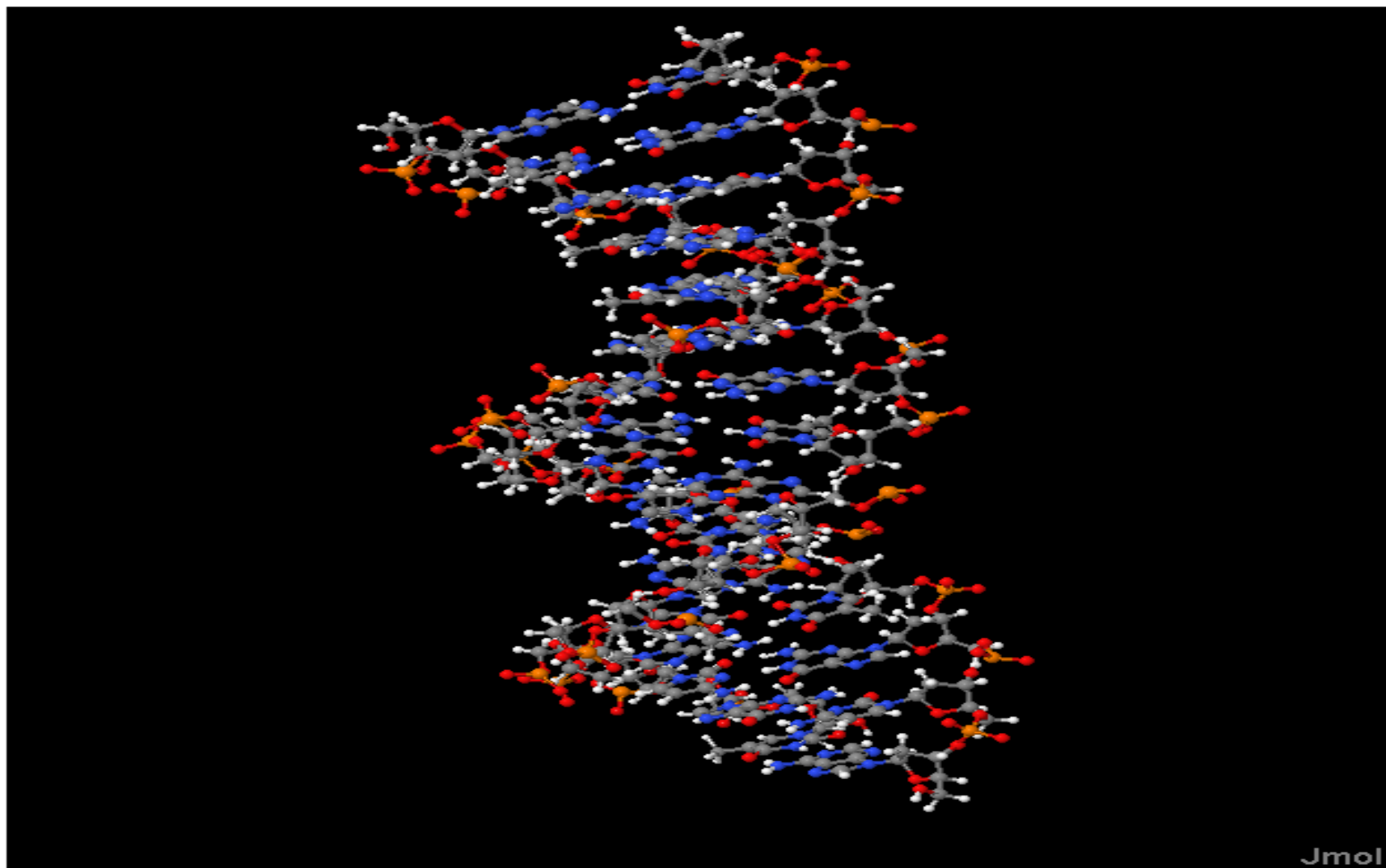


Jmol

Reset to original orientation

Bishop Lab - - Windows Internet Explorer

<http://dna.engr.latech.edu/freedna/sessions/2814/allatom.html>



Jmol

Reset to original orientation

<http://www.transportation.anl.gov/>



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K-2 >

3-5 >

6-8 >

9-12

Home / Teachers / 9 - 12 Lessons

9-12 Lessons



Keeping our Food Safe – Rapid Detection of Contamination Using Bioassays

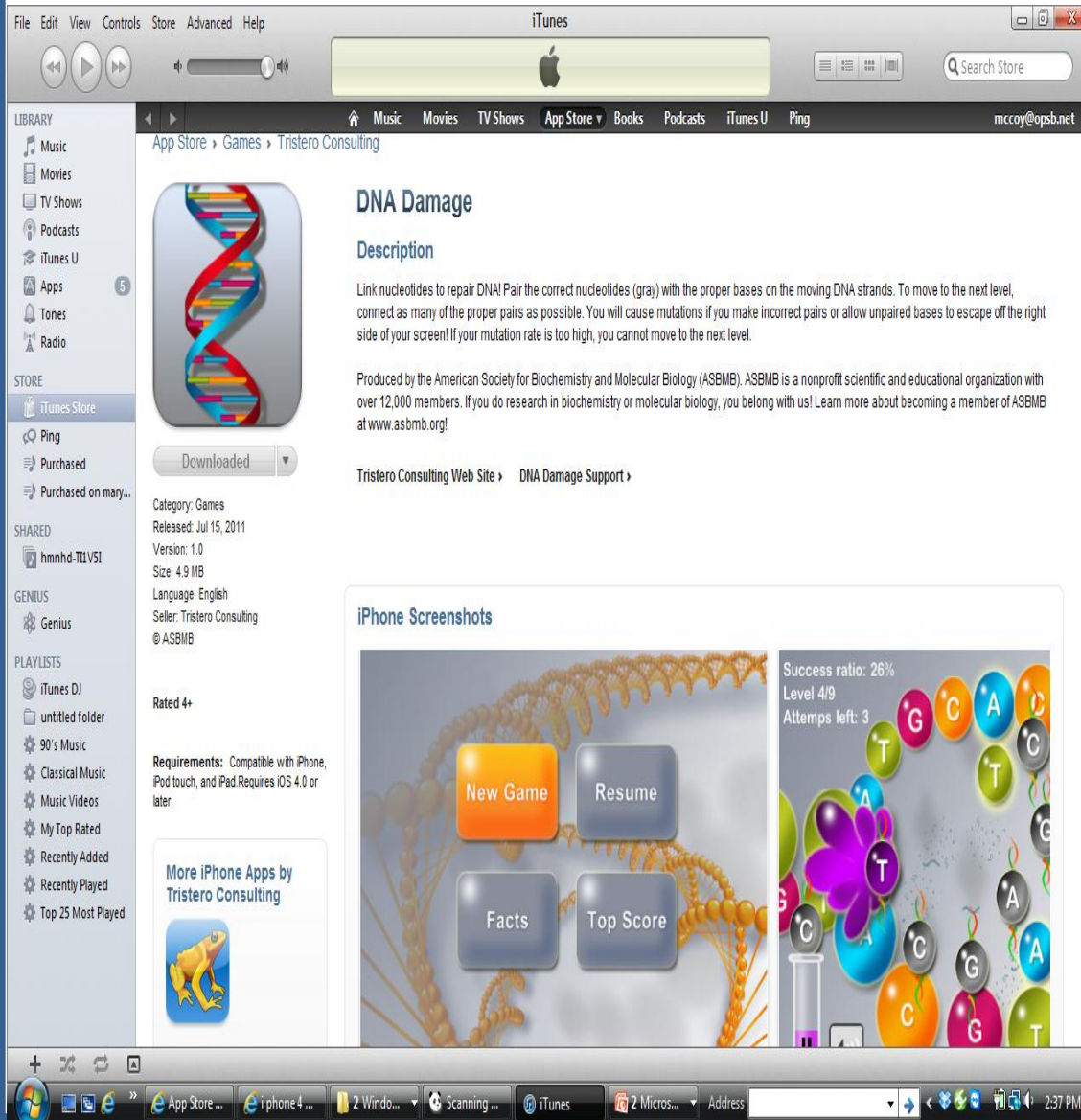
This lesson addresses the scientific dimensions of food safety, the types of bacterial organisms and pathogens that contaminate our food, and the modern technologies that enable us to detect them before they get a chance to infect us.

PDF Download activity



Taking the Energy Challenge

Population growth and an increase in energy demands require us to find new sources of renewable energy that we can use alongside our traditional fossil fuels in order to keep up with growing energy demands in the future. In this lesson, students will explore the physical science of energy, different types of energy, and the technologies that we use for our power supplies.



The screenshot shows the iTunes App Store interface. The top navigation bar includes 'File', 'Edit', 'View', 'Controls', 'Store', 'Advanced', and 'Help'. The main content area displays the 'DNA Damage' app page, which includes a DNA double helix icon, a 'Description' section, and 'iPhone Screenshots'. The description reads: 'Link nucleotides to repair DNA! Pair the correct nucleotides (gray) with the proper bases on the moving DNA strands. To move to the next level, connect as many of the proper pairs as possible. You will cause mutations if you make incorrect pairs or allow unpaired bases to escape off the right side of your screen! If your mutation rate is too high, you cannot move to the next level.' Below the description, it states: 'Produced by the American Society for Biochemistry and Molecular Biology (ASBMB). ASBMB is a nonprofit scientific and educational organization with over 12,000 members. If you do research in biochemistry or molecular biology, you belong with us! Learn more about becoming a member of ASBMB at www.asbmb.org!' The 'iPhone Screenshots' section shows a game menu with 'New Game', 'Resume', 'Facts', and 'Top Score' buttons, and a game play screenshot with a success ratio of 26% and 3 attempts left. The bottom of the screenshot shows the Windows taskbar with various open applications like 'App Store', 'iPhone 4', and 'iTunes'.



This free iPhone game is called ***DNA Damage*** allows the player to pair nucleotides with the proper bases, link nucleotides to repair DNA, connect as many base pairs as possible. If you make incorrect pairs or your mutation rate is too high, you cannot move to the next level.

Produced by the American Society for Biochemistry & Molecular Biology (ASBMB)

TOUR OF THE BASICS

Tour of the Basics

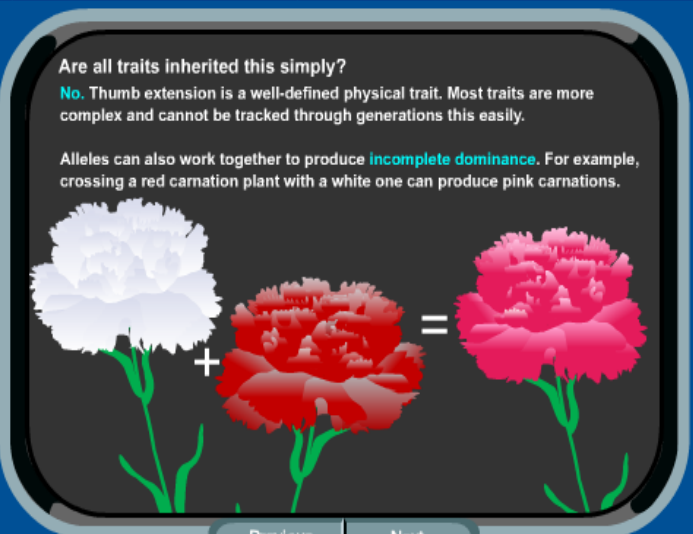
What is a Trait?

What is DNA? What is a Gene? What is a Chromosome? What is a Protein? What is Heredity? What is a Trait?

Are all traits inherited this simply?

No. Thumb extension is a well-defined physical trait. Most traits are more complex and cannot be tracked through generations this easily.

Alleles can also work together to produce **incomplete dominance**. For example, crossing a red carnation plant with a white one can produce pink carnations.



Previous Next

Defining Traits Thumb Trait Trait Inheritance Complex Traits


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tour your neural circuits

:: explore a nerve cell



- :: membrane
- :: nucleus
- :: axon
- :: dendrites
- :: synapse

:: See it in action 

This site is your guide to the amazing living network of nerves that interconnect your brain, muscles, and organs. ::

The Basics

- :: [Keeping your balance: homeostasis](#)
- :: [The neuron](#)
- :: [The nervous system](#)
- :: [Ouch!](#)

:: nervous system explorations



- How fast a message travels
- Simple reflexes
- Brainstorms

Interactive simulations of the nervous system and how it functions are found in the links above. Click

Nerves in Health & Disease

- :: [Brainstorms](#)
- :: [Spinal cord injuries](#)
- :: [Parkinson's disease](#)

For Teachers

<http://www.nsta.org/publications/interactive/nerves/index.html>



cool SCIENCE careers

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- Profession Pathfinder**: A person standing on a path of arrows on the floor.
- Imagine Yourself...**: A man gesturing with his hands.
- Zoom In**: A magnifying glass over a colorful, textured surface.
- My Science Career Pick**: A green thumbs-up button.
- Ask A Scientist**: A woman thinking with her hand to her chin.

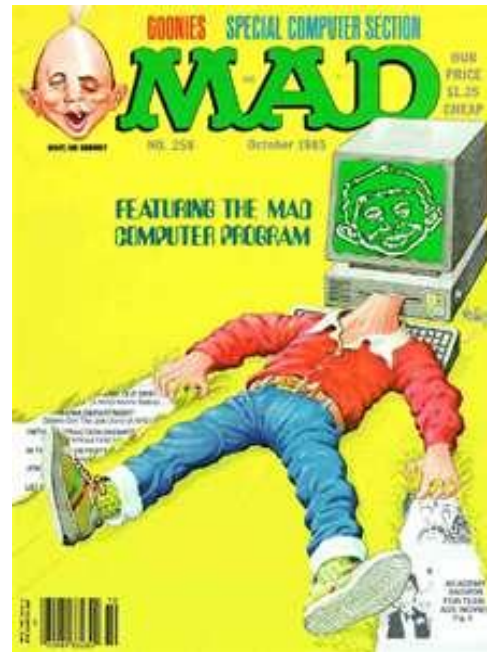
<http://coolsciencecareers.rice.edu/>



Modeling and Simulation 101 - YouTube.url

What IS Computer Programming?

<http://www.youtube.com/watch?v=qHOBC9DYFJA&feature=related>



A special thanks goes out to Tom Bishop, Ramu Ramachandran, Alicia Boudraux, Dr Upaili, Collin Wick, Weizhong Dai, Yuri Lvov, Jim Spaulding, Dr Murray, LA-SiGMA, NSF, LA Tech, all the RET teachers, Graduate students, REU students, and our own students who worked to make this project such a success!!



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