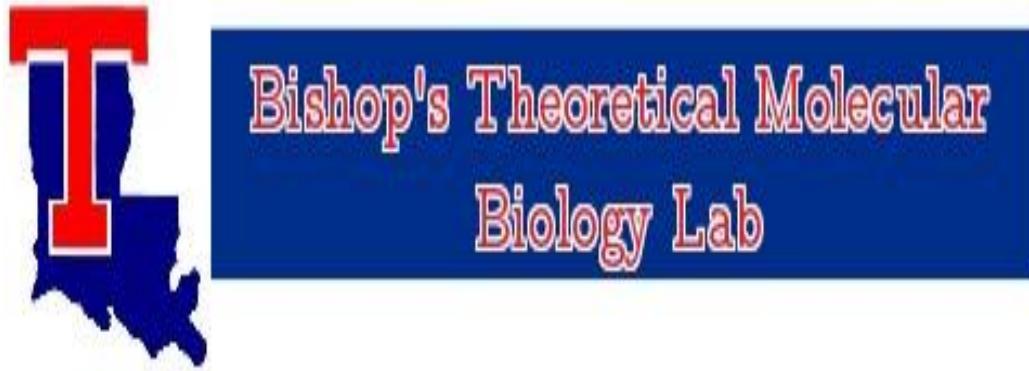


“The amazing challenge of Dr. Tom Bishop’s Project!”

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?

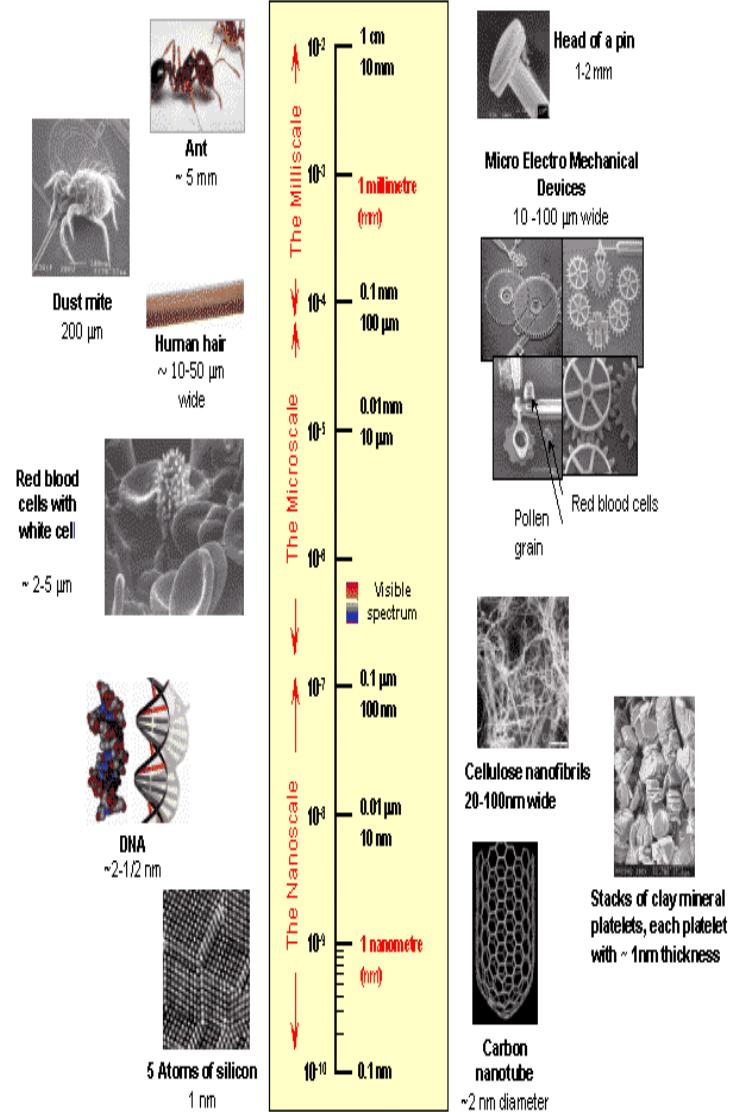
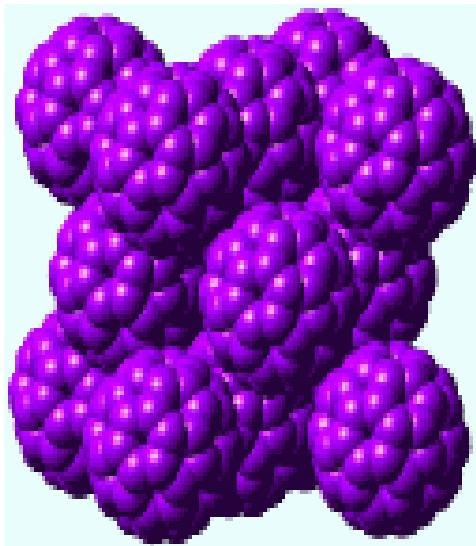


**RET PRESENTATION BY:
MARY BETH MCCOY
JULY 2012**



Let's review what a nanotechnology actually is

- <http://www.youtube.com/watch?v=rcWfHOjiQ4Q>



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=hnSPGIpZx_Q](http://www.youtube.com/watch?feature=iv&annotation_id=annotation_998644&v=f6T0puolr9g&src_vid=hnSPGIpZx_Q)



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

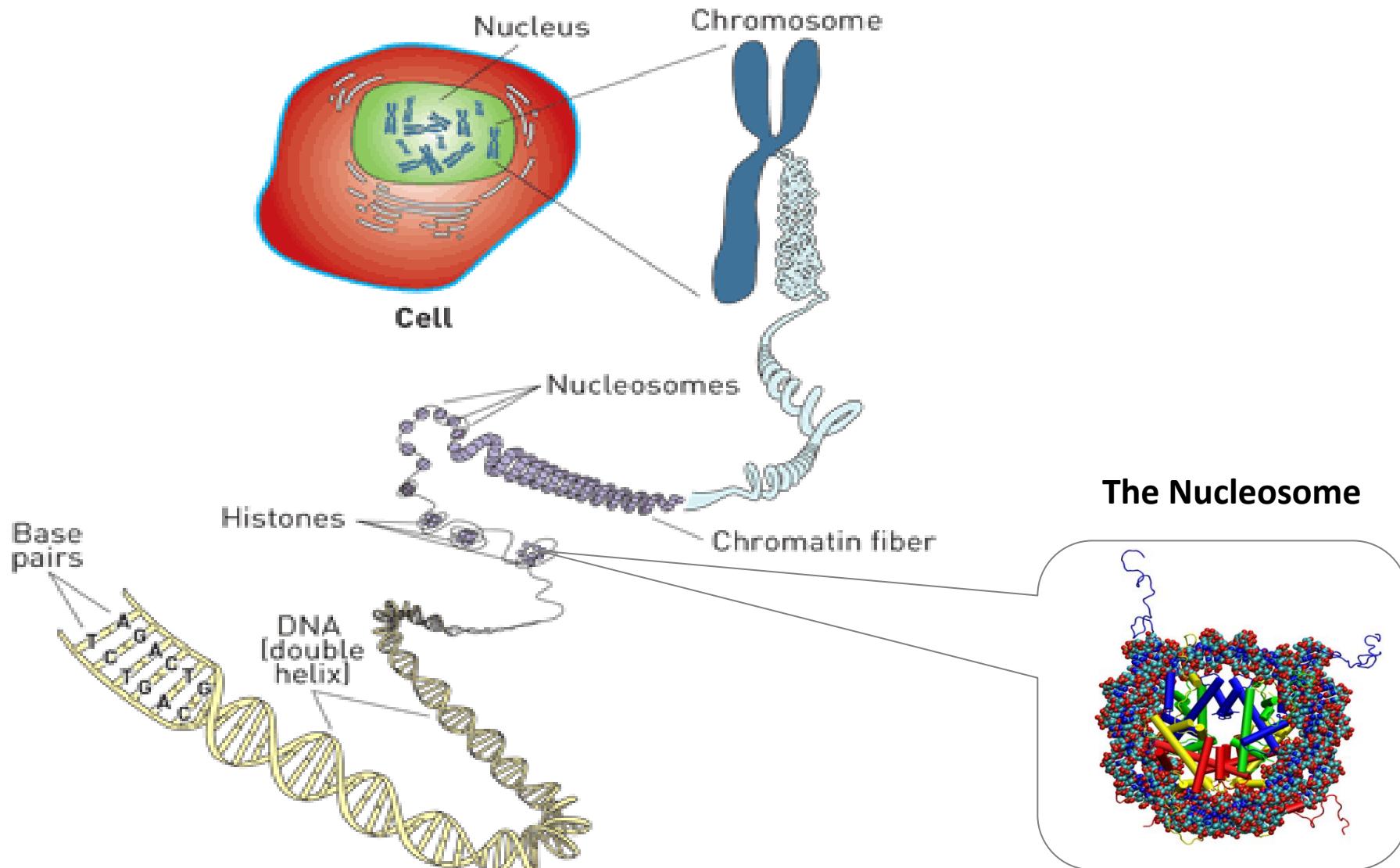
Thomas C. Bishop

LONI Associate Professor

Louisiana Tech University

Ruston, LA

Biology 101 and the Nucleosome

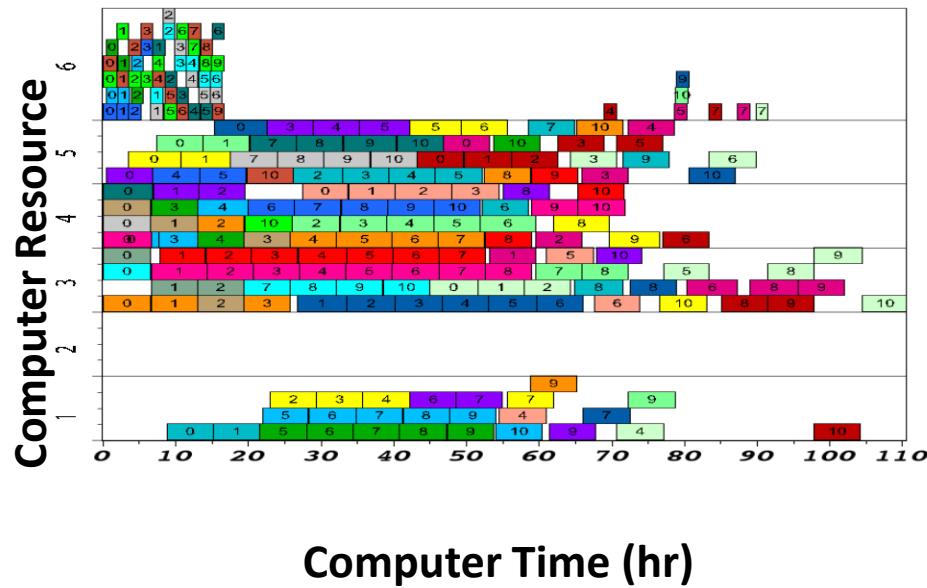
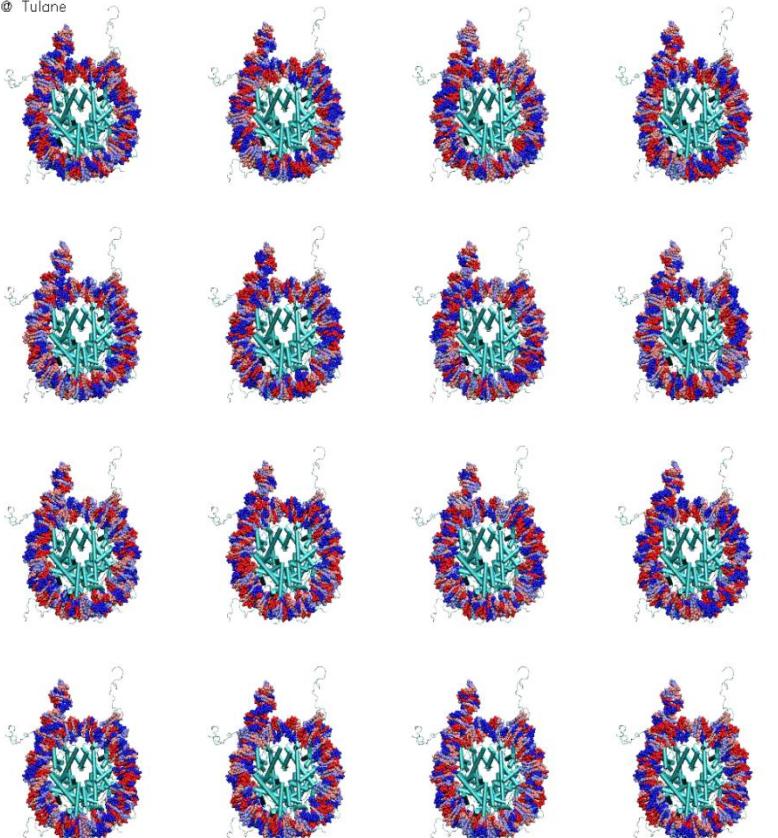


What in the world are the pictures and what was Dr Bishop talking about Monday?

- 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.
-

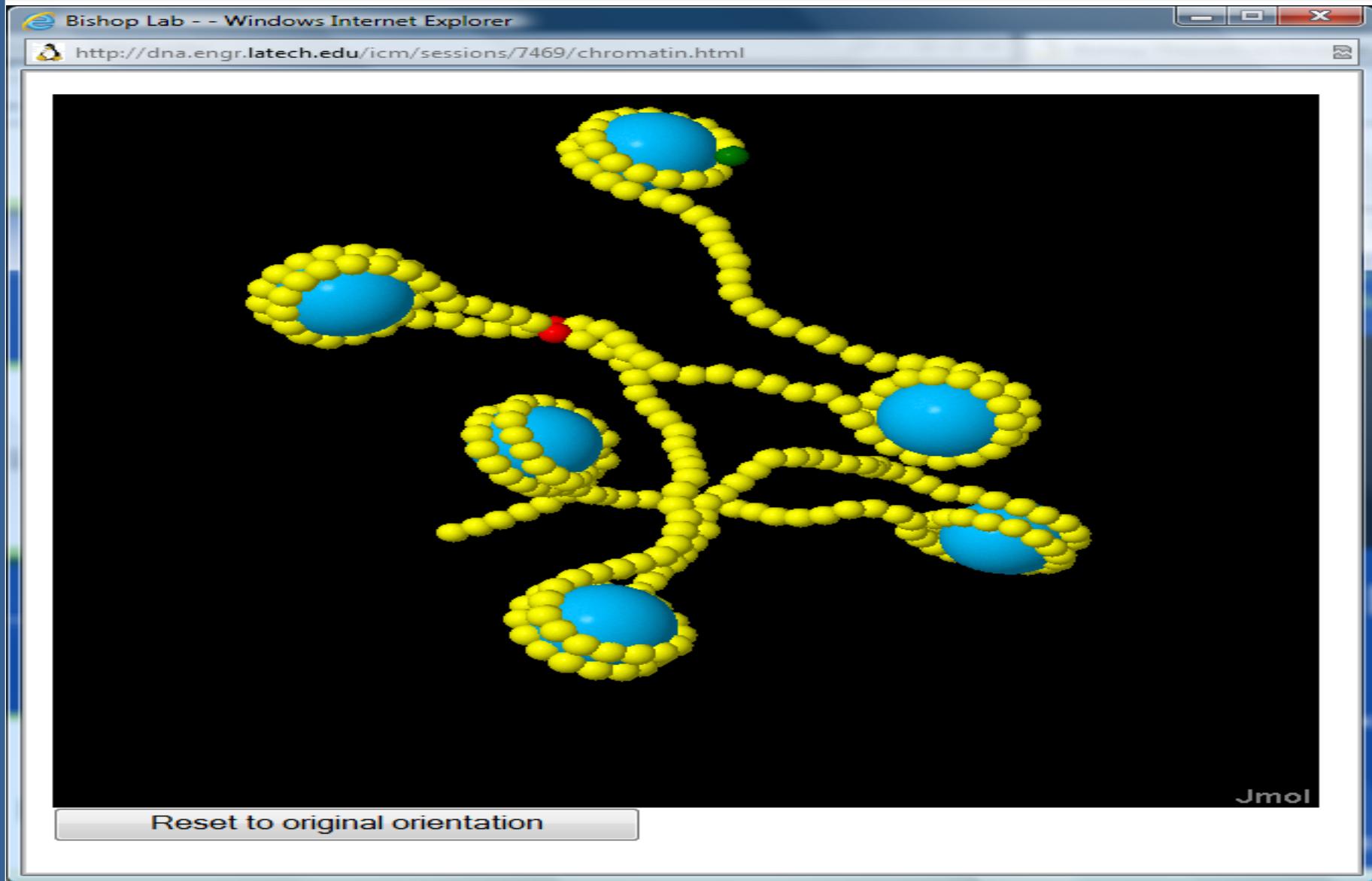
Many Nucleosomes = Many Simulations

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.

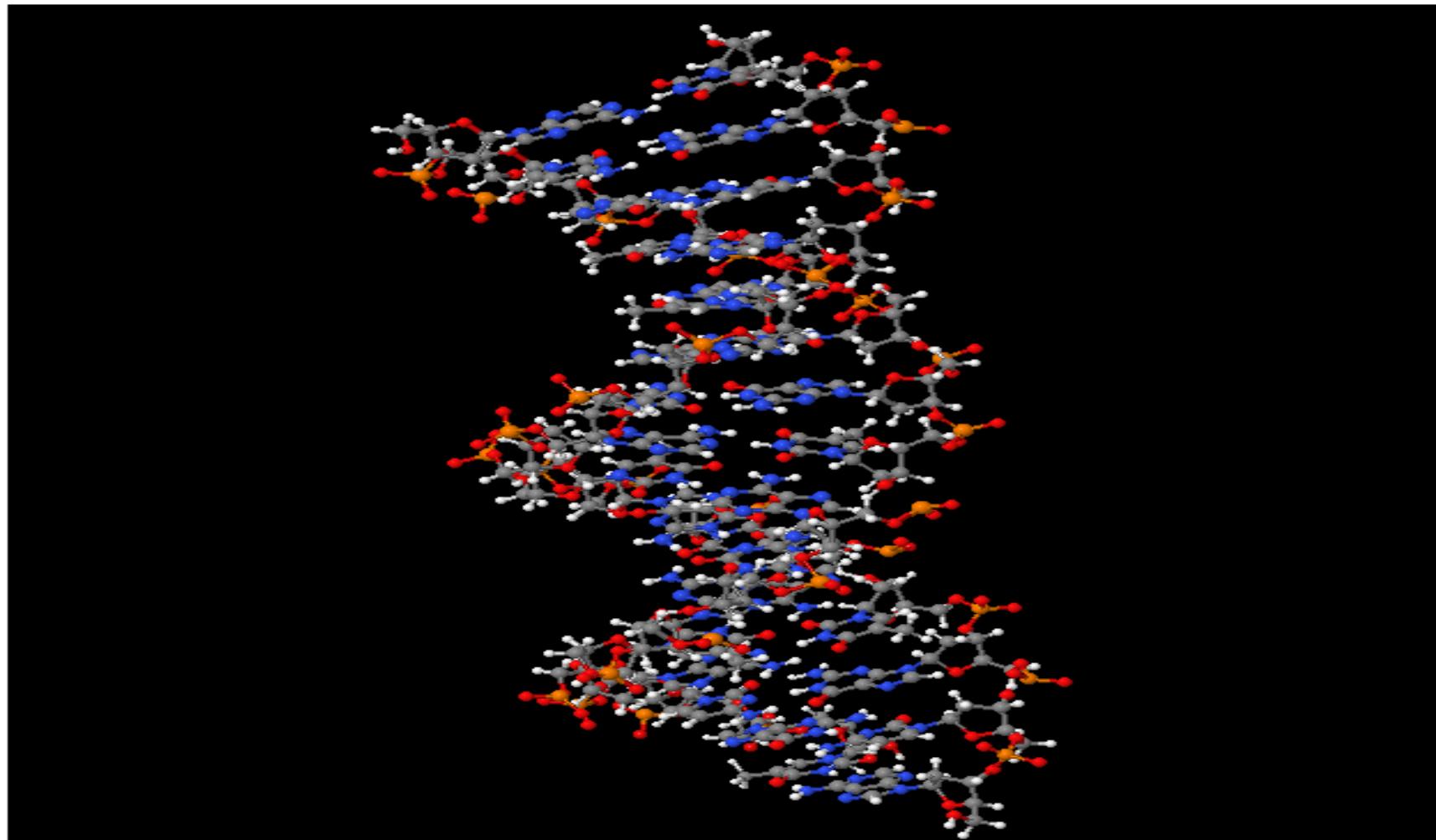


Interactive DNA Maker



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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<http://www.scienceofeverydaylife.com/teachers/nine-to-twelve.cfm>

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3M Discovery EDUCATION SCIENCE OF EVERYDAY LIFE

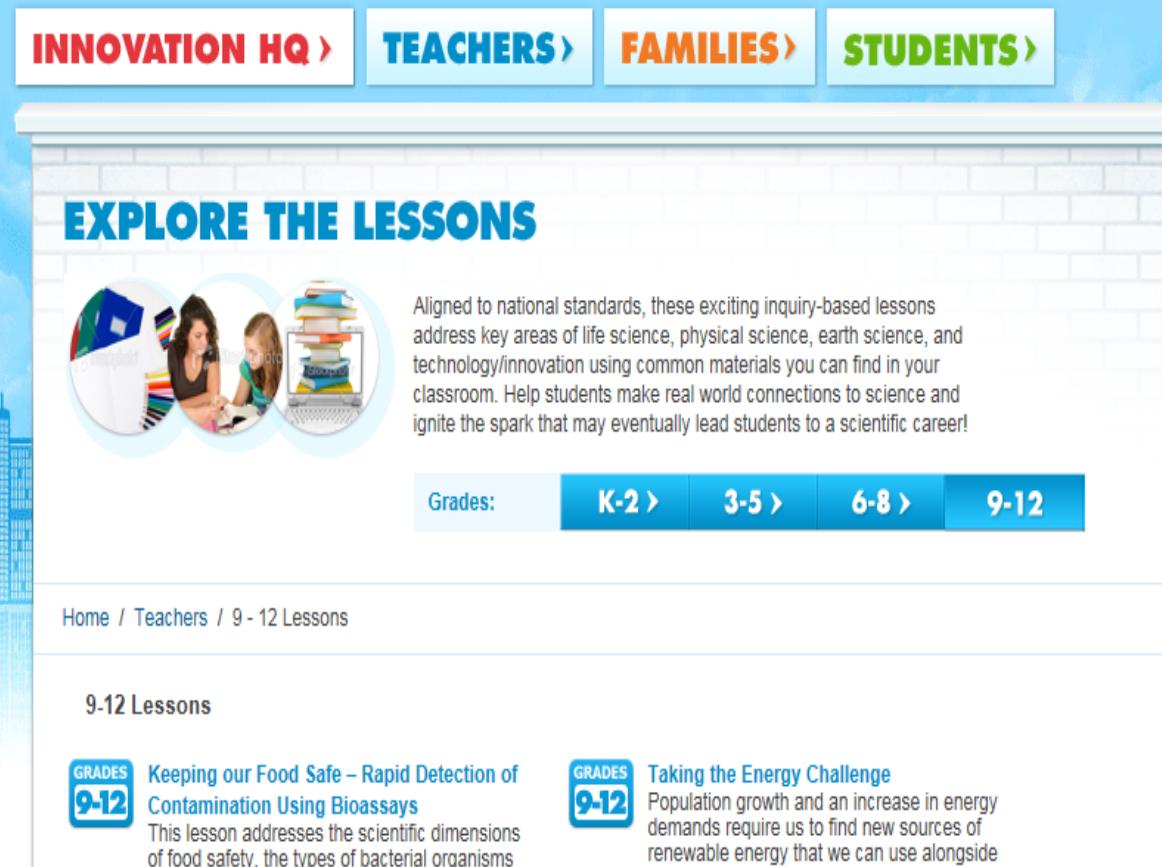
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Grades: **K-2 >** **3-5 >** **6-8 >** **9-12**

Home / Teachers / 9 - 12 Lessons

9-12 Lessons

GRADES 9-12 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

GRADES 9-12 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.

What do all students love to use for entertainment?

A screenshot of the iTunes Store interface. The top navigation bar includes File, Edit, View, Controls, Store, Advanced, Help, Music, Movies, TV Shows, App Store, Books, Podcasts, iTunes U, Ping, and a search bar. On the left, a sidebar lists categories like LIBRARY (Music, Movies, TV Shows, Podcasts, iTunes U, Apps, Tunes, Radio), STORE (iTunes Store, Ping, Purchased, Purchased on many...), and SHARED (hmnhd-T1V51). The main content area shows the game 'DNA Damage' by Tristero Consulting. The game's icon features a stylized DNA double helix. Below the icon, the status 'Downloaded' is shown with a dropdown arrow. The game's details are listed: Category: Games, Released: Jul 15, 2011, Version: 1.0, Size: 4.9 MB, Language: English, Seller: Tristero Consulting, © ASBMB. It has a rating of Rated 4+. Requirements: Compatible with iPhone, iPod touch, and iPad. Requires iOS 4.0 or later. A link to 'More iPhone Apps by Tristero Consulting' is provided, along with an icon of a frog. To the right, there is a section titled 'iPhone Screenshots' showing a game interface with a DNA helix background and four buttons: New Game, Resume, Facts, and Top Score. A success ratio of 26% and attempts left are also displayed. At the bottom, the taskbar shows icons for App Store, iPhone 4..., 2 Windo..., Scanning..., iTunes, 2 Micros..., Address, and several system icons.



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)

http://learn.genetics.utah.edu/content/begin/tour/index.html

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<http://learn.genetics.utah.edu/content/begin/tour/index.html>

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TOUR OF THE BASICS

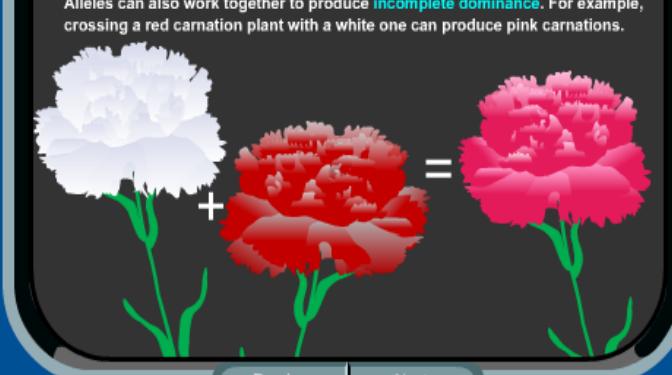
Tour of the Basics

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

© 2004 Genetic Science Learning Center, University of Utah

learn.genetics.utah.edu

You can also download the Tour, in either a Windows or Mac version, directly to your computer so that you can run it whenever you want, without an Internet connection.

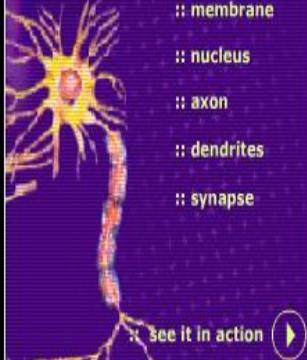


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tour your neural circuits

:: explore a nerve cell

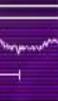


- :: membrane
- :: nucleus
- :: axon
- :: dendrites
- :: synapse

:: see it in action 

:: 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

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

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Suggested Sites Get more Add-ons

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



The screenshot shows the homepage of the coolsciencecareers.rice.edu website. The page has a dark background with several interactive elements:

- A large orange arrow on the left containing the text "cool SCIENCE careers".
- A man standing on a path made of arrows pointing towards the text "Imagine Yourself...".
- A "Zoom In" button with a magnifying glass over a red and yellow circular pattern.
- A "My Science Career Pick" button featuring a green thumbs-up icon.
- A woman thinking, labeled "Ask A Scientist".
- A "Help Us Improve This Site! CLICK HERE" button.
- Links for "ABOUT" and "FEEDBACK".

Below the main content, there is a navigation bar with links to "RICE", "4 Internet Explorer", "Favorites", "RET Presentation 20...", "My RET Presentatio...", "Scanning system", and the current page "coolsciencecareers.rice.edu".

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

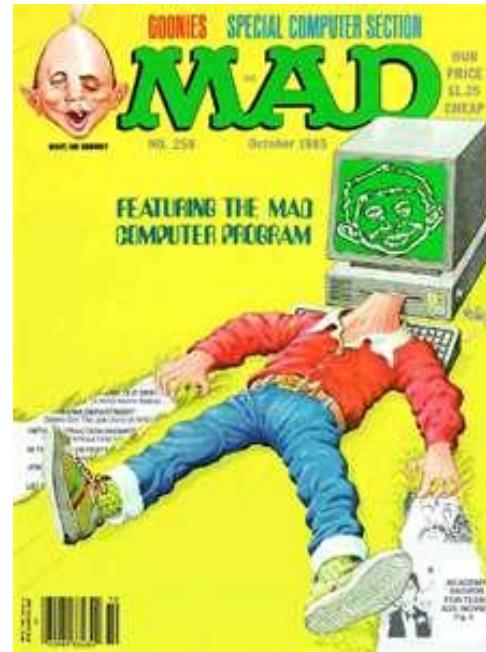




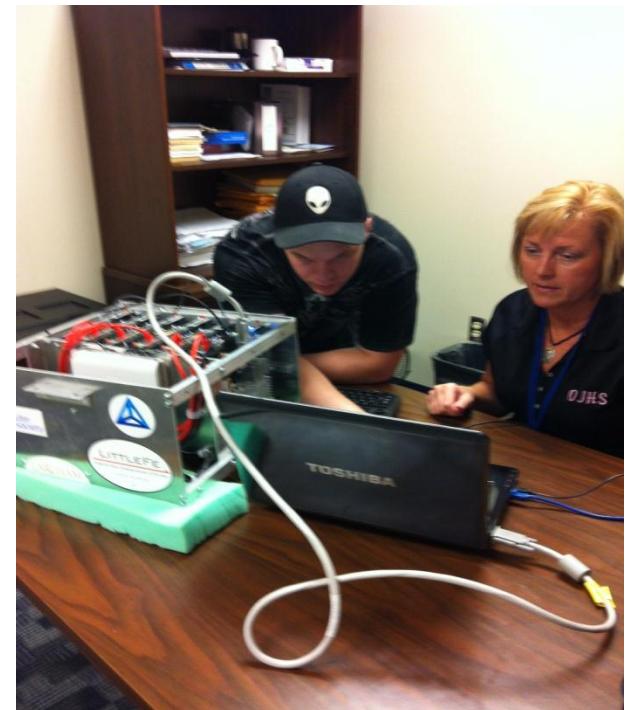
Modeling and Simulation 101 - YouTube.url

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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