

Welcome to the B-3 program

- Today:
 - Getting started – people, expectations, teams
 - Plants & blight
 - Lab skills – accurately measuring small volumes of liquids
 - Scientific Method
 - What do you know as you start the program?



What is B-3?

What is B-3?

- Biotechnology
- Biodiversity
- Bioinformatics

What is biotechnology?

- Bio:

- Technology:

Biotechnology:

The use of living **cells** and their **molecules** to make useful products

BIOTECH'S SUMMER PROGRAM 2012

**Biotechnol
ogy**

Biodiversity

**Bioinforma
tics**



Biodiversity

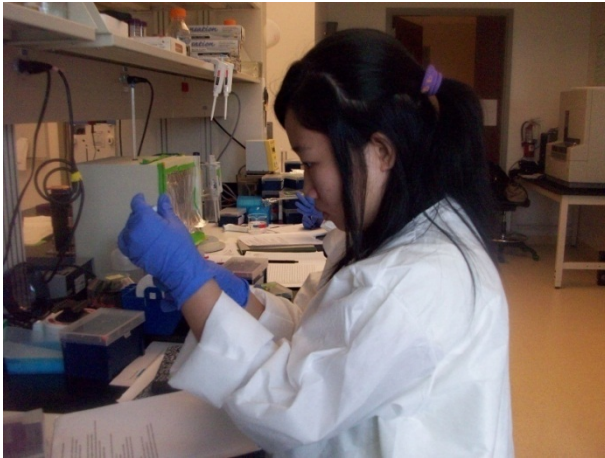
- researching the near extinction of an important NC tree species



**American Chestnut Tree
being lost to disease**

Biotechnology

- to investigate genetic make-up of trees



Bioinformatics

- use of computer technology for analysis



SITE MAP

Alphabetical List
Resource Guide

About NCBI

An introduction to
NCBI

GenBank

Sequence
submission support
and software

Literature databases

PubMed, OMIM,
Books, and PubMed
Central

Molecular databases

Sequences,

What does NCBI do?

Established in 1988 as a national resource for molecular biology information, NCBI creates public databases, conducts research in computational biology, develops software tools for analyzing genome data, and disseminates biomedical information - all for the better understanding of molecular processes affecting human health and disease. [More...](#)

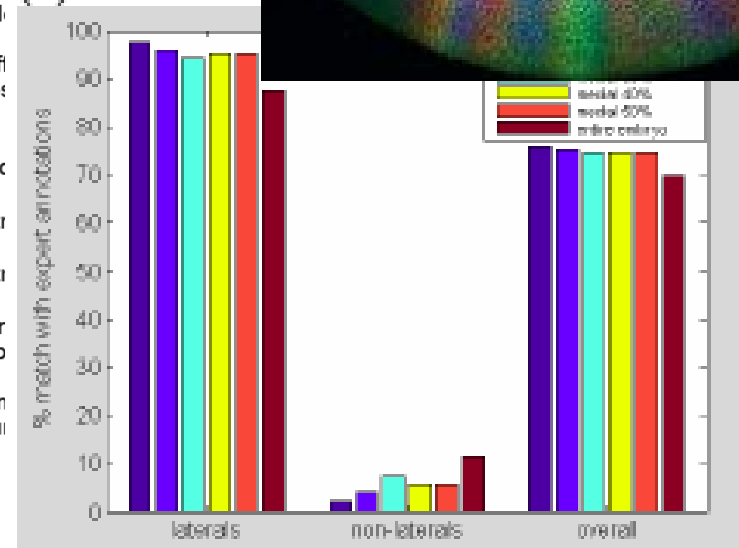
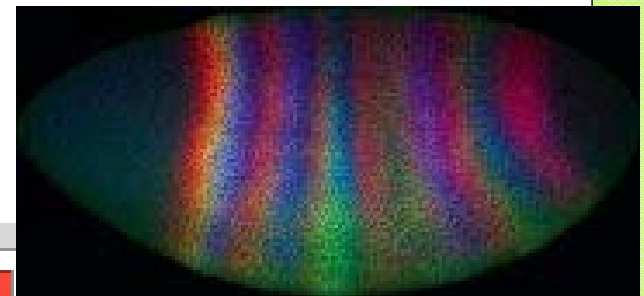


1 Billion Live Traces

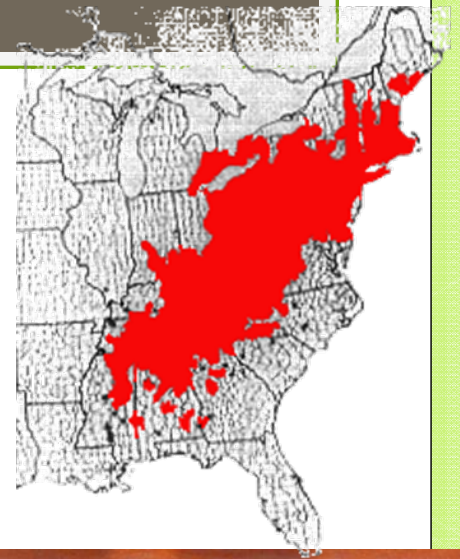
The Trace Archive of sequencing traces has reached 1 billion live traces from over 480 organisms. For more information about the Trace Archive database [click here](#).

Hot Spots

- ▶ Assembly Archive
- ▶ Clusters of orthologs
- ▶ Cofactors in NCBI
- ▶ Electrophoretic mobility shift assay
- ▶ Entrez
- ▶ Entrez
- ▶ Genomes
- ▶ Human resources



American Chestnut Tree



A fungus blight killed most American Chestnut Trees by 1950



Chestnut Family

(*Castanea species*)

	Chinkapin	Japanese	Chinese	European	American
Blight resistance	slight	moderate	high	slight	none

Essential Question: Why does the American Chestnut tree have no blight resistance while the Chinese Chestnut tree has high resistance? What is the difference in its genetic make-up?

Introductions

- Staff
- Getting to Know You Activity

Daily Schedule

- June 11th - 29th

- 9 am - 2 pm

- Lunch & breakfast

- Starts 6/14

- 9:00 - 10:00 am

- Computer based

- Room 108

- Snack

- 10:10 - 12:00 am

- Lab Skills

- 12:00 - 12:30 pm

- Lunch

- 1:00 - 2:00 pm

- Lab Skills



Reminder –
Bring Lunch
Tuesday and
Wednesday

Expectation of students

- Enjoy the research investigation
- Positive attitude
- Commitment to fully participate each day
- Cooperative behavior
- Proper clothing

Instructor contact information

- Mrs. Smith
 - Jeanne.smith@cms.k12.nc.us
 - 704-408-7445
- Ms. Putnam
 - Ericaa.putnam@cms.k12.nc.us
- Dr. Jennifer Weller
 - jweller2@uncc.edu

B-3 Summer Program

We are able to offer this program:

- Dr. J. Weller
- GetBiotechSmart grant –
 - American Soybean Board
- Bright Ideas grant-
 - Union Power Cooperative
- NC Biotechnology Center
- Greiner Bio-One

- Arrowood Business Association
- Seigle Avenue P. Church

What is biotechnology?

- What makes biotechnology different from other sciences?
- Where does it impact our lives?
 - Food
 - Health
 - Clothing
- Why do people get excited about the opportunities it creates?
- Why do people have concerns?



**Where is
biotechnology
used?**

Medicine

Insulin =>
biotechnology is used
to make medicines
that *treat* disease



Flu shot =>
biotechnology is used
to make vaccines that
help *prevent* disease



Blood test for cholesterol =>
biotechnology is used
in diagnostic tests
that *detect* disease



Agriculture

Biotechnology is used to produce enhanced crops:

- Disease resistant
- Weather resistant
- Improved nutrition
- New variants

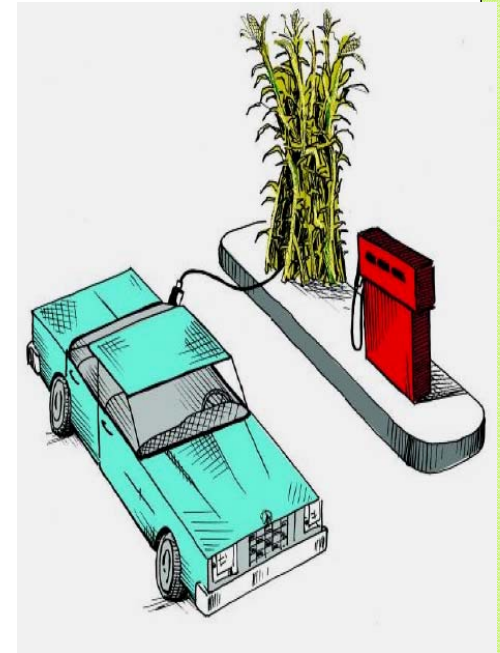


Agriculture

- Cotton
 - Canola (rape seed)
 - Soybeans
 - Corn
-
- Dairy – enzyme to stimulate milk production
 - Cheddar cheese

Industry

- Biofuels: Biodiesel and bioethanol
 - 10% of fuel in NC by 2017
- Green Plastics:
used in packaging
and cloth production



Consumer Products

- Stone washed jeans
- Stain removal in laundry detergent
- Gas suppression (Beano)

How will we use biotechnology?

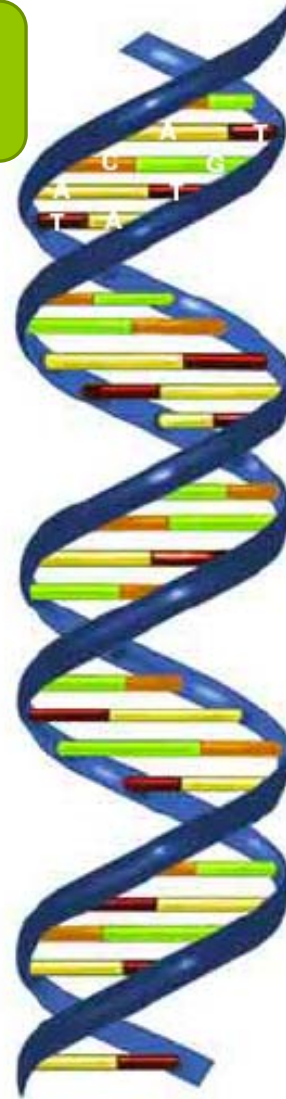
To determine how the DNA is different between the American Chestnut and the Chinese Chestnut Tree

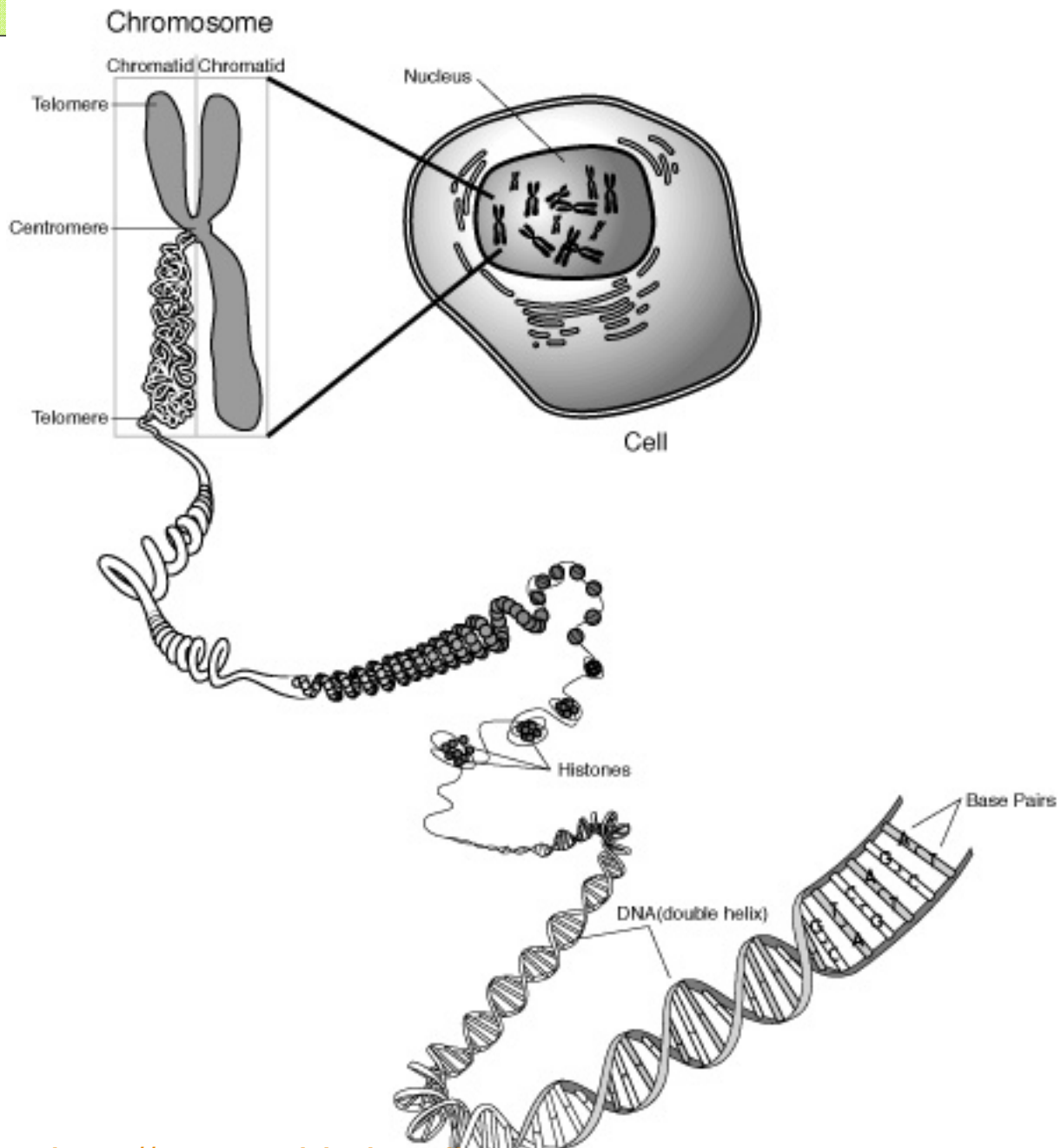
What makes the American Chestnut tree susceptible to blight and the Chinese Chestnut tree resistant?

DNA

- **DNA:** the chemical inside the nucleus of a cell that carries the genetic instructions for making living organisms.
- The scientific name for DNA is deoxyribonucleic acid.

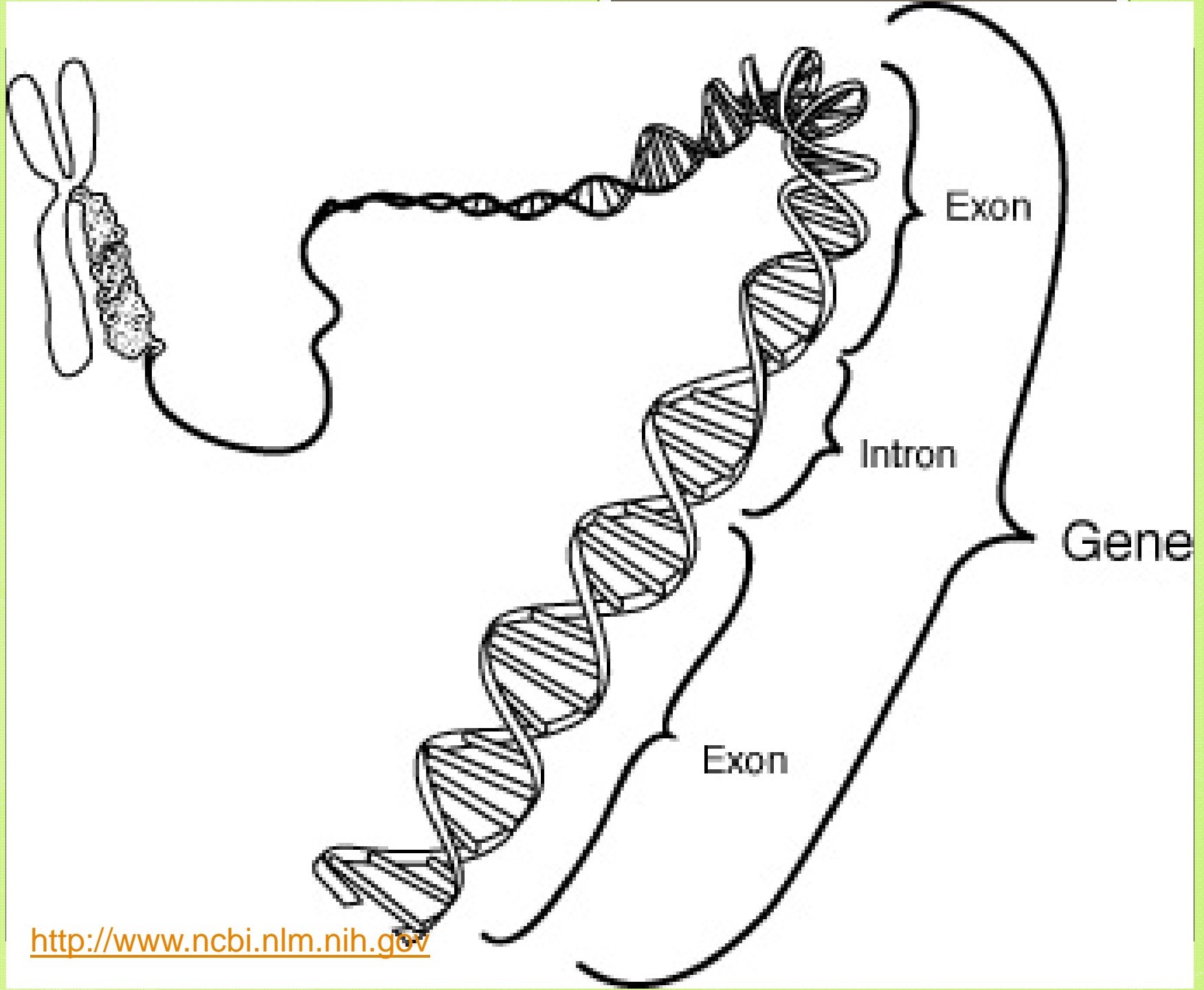
DNA





Chromosomes

- A chromosome is one of the threadlike "packages" of genes and other DNA in the nucleus of a cell.
- Each parent contributes one chromosome to each pair, so each offspring gets half of its chromosomes from its "mother" and half from its "father".



Gene

- A gene is a section of DNA
- Most genes contain the information for making a specific protein.

DNA Contains Chromosomes, Genes

DNA:

Chromosomes



Genes



Gene 1



Gene 2

Genes Provide Instructions for Making Proteins

DNA:

Chromosomes



Genes



Proteins



Gene 1



Protein 1



Gene 2



Protein 2

Proteins Have Functions

DNA:

Chromosomes



Genes



Proteins



Function



Gene 1



Protein 1



*Blue eye
color*



Gene 2



Protein 2



*Blood clotting
factor*

Genome

- A genome is all the DNA contained in an organism or a cell, includes:
 - the chromosomes
 - plus the DNA in mitochondria (and DNA in the chloroplasts of plant cells).