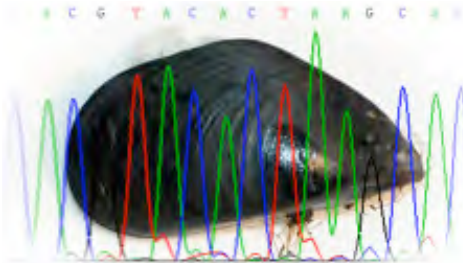


# Marine Biotechnology and Bioinformatics



A program of ITEST (Information Technology Experiences for Students and Teachers) funded by the National Science Foundation



## WESTHILL CSI DNA Fingerprinting

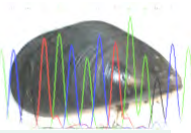
Biology

Combined 9<sup>th</sup> and 10<sup>th</sup> Grade

Neal Perry

Westhill HS

Stamford, CT



# Biological Context

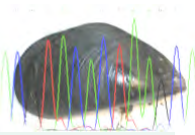
## ➤ **Characterizing Variation in Species**

Follows Genetics, Mendel, mutation, a GM food activity, DNA extraction lab and a PCR activity

Prelude to Bioinformatics/evolution activity, Darwin/natural selection, populations and to epi- and pandemics

## ➤ **Charismatic STEM Lab**

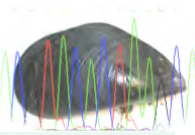
Relate careers and current technology to problem solving



## Marine Biotechnology and Bioinformatics 2007-2008



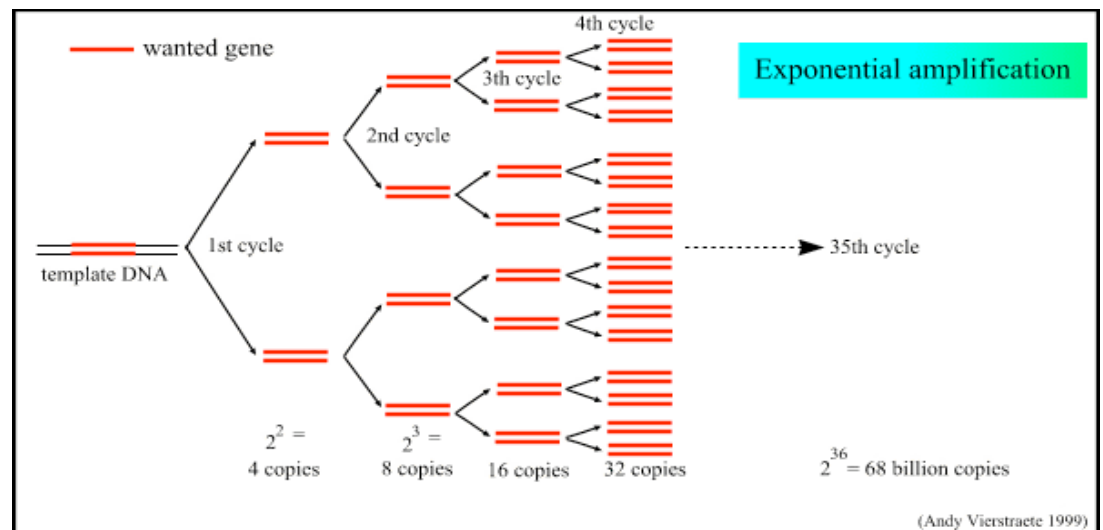
DNA Fingerprinting

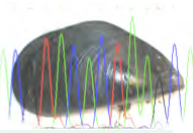


## CREATING A HAYSTACK FROM A STRAW

### ... PCR

- Meiosis and mutation contribute to unique variation
- Selective and tiny DNA samples can be Xeroxed to billions of copies for use in comparing evidence to suspects by PCR

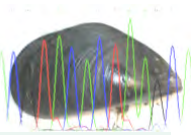




## **CONNECTICUT STANDARDS:**

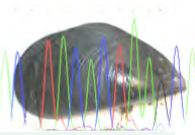
- **Grade 9-10 Core Scientific Inquiry, Literacy and Numeracy**
  
- **10.3 Cell Chemistry and Biotechnology**
  
- **10.4 Heredity and Evolution**
  
- **10.5 Enrichment Standard, Selection and Populations**

<http://www.sde.ct.gov/sde/site/default.asp>



# GEL ELECTROPHORESIS

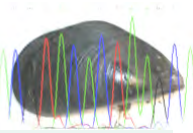
- Explain DNA fingerprinting and preparation
- Explain the use of the variable number of tandem repeats in amplifying DNA in PCR



# DNA Fingerprint Simulation

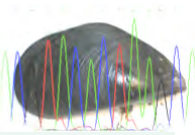
## Materials

- *Carolina* Forensics kit
- Mini electrophoresis units
- Test-tube holder
- Microwave
- 20 ul automatic pipettes and tips
- Deionized water
- Masking Tape



# LESSON DESIGN

- Previous readings on DNA Technology
- Cast practice gel with middle comb
- Practice loads
- Cast, load DNA and run gels
- Draw & label PCR
- Follow-up with CLUSTAL and BLAST evolution

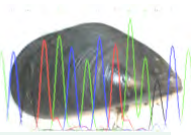


## Assessment

- Sequential drawings of PCR
- Students solved the murder based on their DNA evidence
- Open ended write-up of gel results



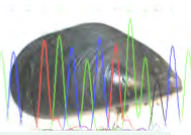
differences in separation and band intensity  
increased DNA concentration?  
identical twins  
more than two lanes have identical bands



## Learning Outcomes

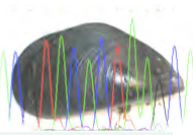
- Students clearly understood the premise of matching DNA evidence with suspects
- Understanding PCR especially the use of probes improved from a previous lesson





## Lessons Learned

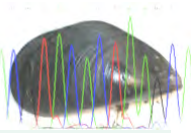
- Too much time spent worrying about presentation-peer pressure
- Field Trip or speaker for STEM next year
- Run Lab earlier in year and tie into Replication
- PCR drawing concurrent to gel good idea



## Contact

➤ For more information on this lab:

Neal Perry  
Westhill HS  
125 Roxbury Rd  
Stamford, CT, 06511  
203-977-4494  
nealperryaq@aol.com



## Resources

- Period #4 Biology Students
- *Modern Biology*, Holt, Rinehart and Winston, 1999
- *Carolina Biology* Forensics Kit
- On-line data bases, CLUSTAL and BLAST
- Puterbaugh & Burleigh, ..Evolution&Databases.., *Am Biol Teacher*, 63 (6):422-431