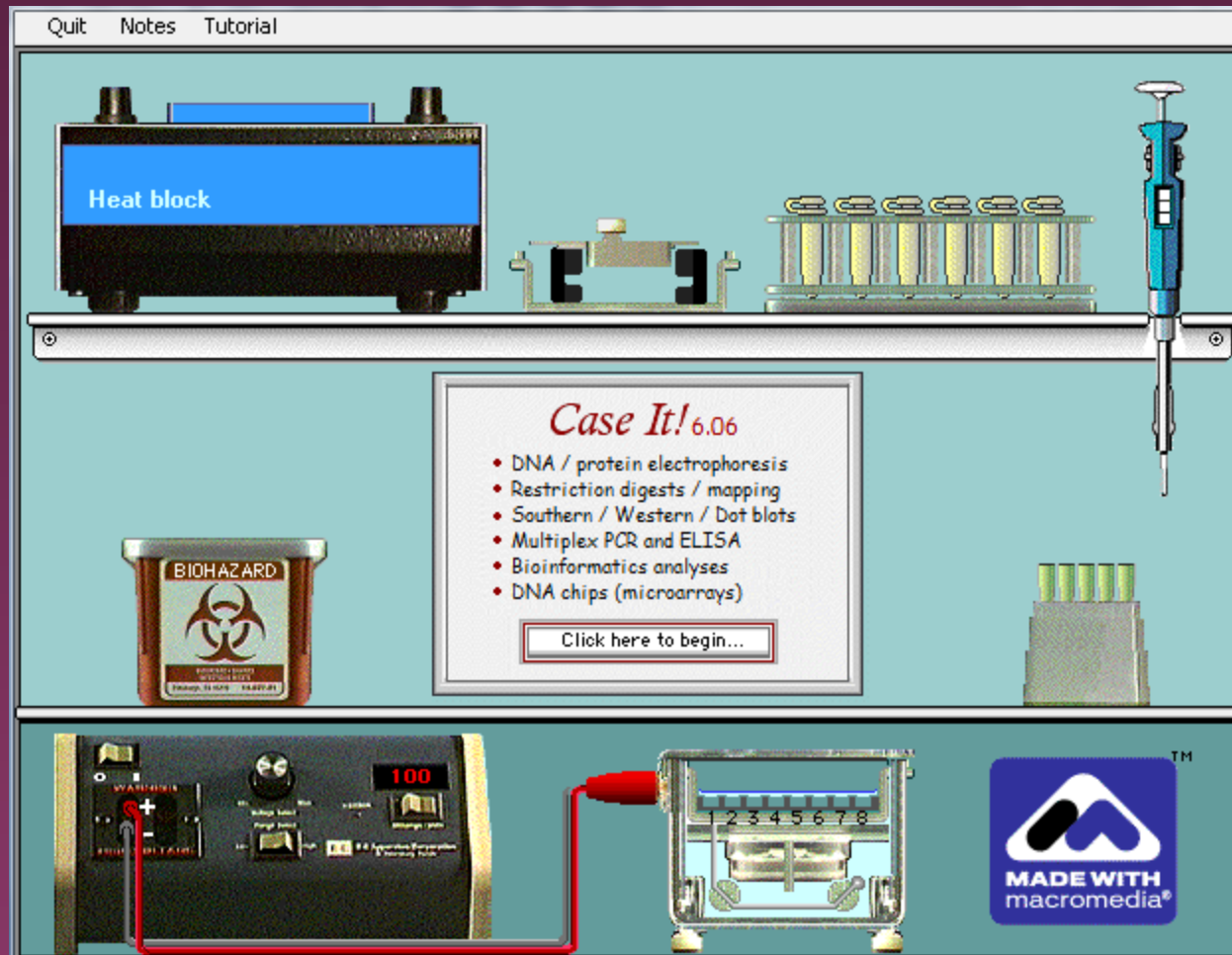


Case It workshop: integrating molecular biology computer simulations and bioinformatics into case-based learning and student research

Mark Bergland and Karen Klyczek University of Wisconsin-River Falls



BioQUEST Summer Workshop, Goucher College, 2012

Case It! Project

URL for Case It! Home Page:

<http://caseit.uwrf.edu>

- Includes tutorials and download links
- Access to cases descriptions, problem spaces

Contact: mark.s.bergland@uwrf.edu



Supported by the TUES program (formerly CCLI) of the National Science Foundation

Workshop overview

- History of the Case It project
- Current application – HHMI SEA-PHAGES
- Case examples - Huntington's disease
- Case It Mobile - HIV
- Microarray cases - breast cancer gene expression and SNP microarray for prostate cancer
- Case development – your ideas

History of Case It Project

- 1993 AMCBT meeting – John Jungck
- 1994 BioQUEST workshop - Peter Woodruff
- 1995 BioQUEST workshop - Joyce Cadwallader, Virginia Carson, and Bill Coleman
- 1996 BioQUEST workshop – Margaret Waterman
- 2006 and 2007 BioQUEST workshops – Arlin Toro, Rafael Tosado-Acevedo, Chi-cheng Lin, Dinitra White
- 2008 and 2009 SCOPE workshops – Ethel Stanley and Sam Donovan
- 2012 The Science Case Network (RCN-UBE)

Case It! Project

Electronic framework for analyzing and discussing case studies in molecular biology

- Genetic and infectious diseases and associated ethical issues
- Students gather background information on cases
- Analyze DNA and/or protein sequences using Case It! simulation
- Online poster sessions
- Role-playing

Techniques for DNA and protein analysis

Case It! simulation

Features of Case It! simulation

- DNA and protein electrophoresis
 - Restriction enzyme digestion and mapping
 - Southern blotting
 - Dot blotting
 - Polymerase Chain Reaction (single and multiplex)
 - ELISA
 - Western blotting
 - Microarrays (SNP and expression)
- Case studies in genetic and infectious diseases and other biology topics

Case It! Simulation

New features in version 6.06

- Bioinformatics tools
 - » Open and save FASTA sequences
 - » Connection to BLAST and other NCBI tools
 - » Integration with MEGA software
 - Alignments
 - Tree building
 - » Other
- Microarray simulation
 - » SNP
 - » Expression

Workshop overview

- History of the Case It project
- Current application – HHMI SEA-PHAGES
- Case examples - Huntington's disease
- Case It Mobile - HIV
- Microarray cases - breast cancer gene expression and SNP microarray for prostate cancer
- Case development – your ideas

Workshop overview

- History of the Case It project
- Current application – HHMI SEA-PHAGES
- Case examples - Huntington's disease
- Case It Mobile - HIV
- Microarray cases - breast cancer gene expression and SNP microarray for prostate cancer
- Case development – your ideas

Huntingon's disease case

Case scenario - from Case It web site

Restriction enzyme digestion and Southern blot

PCR and gel electrophoresis

Sequence analysis - detect triplet base repeat,
sequence alignment and BLAST to identify
gene

Workshop overview

- History of the Case It project
- Current application – HHMI SEA-PHAGES
- Case examples - Huntington's disease
- Case It Mobile - HIV
- Microarray cases - breast cancer gene expression and SNP microarray for prostate cancer
- Case development – your ideas

Workshop overview

- History of the Case It project
- Current application – HHMI SEA-PHAGES
- Case examples - Huntington's disease
- Case It Mobile - HIV
- Microarray cases - breast cancer gene expression and SNP microarray for prostate cancer
- Case development – your ideas

Breast cancer case

- Woman diagnosed with breast cancer, without prior risk factors
- Microarray analysis used to determine potential for aggressive growth and invasiveness of tumor

Prostate cancer case

- PSA blood test, link to prostate cancer being questioned
- SNPs associated with naturally high blood PSA levels detected by microarray
 - Should biopsy be done based on high PSA test result?

Workshop overview

- History of the Case It project
- Current application – HHMI SEA-PHAGES
- Case examples - Huntington's disease
- Case It Mobile - HIV
- Microarray cases - breast cancer gene expression and SNP microarray for prostate cancer
- Case development – honey bee example, your ideas on Case It forum page

Case It! Project

Additional Collaborators

- Mary Lundeborg, Biology Department, University of Wisconsin-River Falls
- Chi-Cheng Lin, Computer Science Department, Winona State University
- Arlin Toro, Biology Department, Inter American University of Puerto Rico-San German campus
- Rafael Tosado, Medical Technology Program, Inter American University of Puerto Rico-Metropolitan Campus
- C. Dinitra White, Biology Department, North Carolina A&T State University