

The **Dolan DNA Learning Center (DNALC)** is the world's first science center devoted entirely to genetics education. The DNALC is an operating unit of **Cold Spring Harbor Laboratory (CSHL)**, a world-renowned research institution that has been home to four Nobel Prize winners. According to *Science Watch's* most recent study, CSHL ranked third in the world among molecular biology and genetics research institutions for the impact of papers published in 2002-06.



Harlem DNA Lab draws on the DNALC's long experience in translating current biological research into hands-on learning activities and establishing teaching centers worldwide. *Harlem DNA Lab* makes use of instructional methods and technology developed with more than \$26 million in federal and foundation grants. Since its founding in 1988, the DNALC has provided experiments for over 325,000 students from the NY metro area during field trips, in-school instruction, and DNA summer camps. More than 8,000 educators have received intensive training at DNALC workshops conducted in 42 states and several countries.

The 1,200 square foot *Harlem DNA Lab* occupies a former graphics arts classroom in the John S. Roberts Educational Complex (J.H.S. 45). The state-of-the-art laboratory is equipped with dissecting and compound microscopes, autoclave, incubators, centrifuges, micropipets, electrophoresis apparatuses, DNA thermal cycler, and DNA chip analyzers. The laboratory will accommodate up to 32 students for experiments ranging from basic genetics and cell biology to modern DNA manipulation and typing. *Harlem DNA Lab* is directly administered by the DNALC and is staffed by educators and Ph.D. biologists who have been trained to deliver an exceptional learning experience for every visitor.

Where:

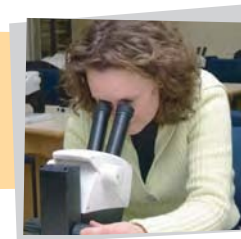
John S. Roberts
Educational Complex
(J.H.S. 45)
2351 First Avenue at 120th Street
East Harlem, New York 10035
On the web: www.dnalc.org/harlemdnalab



To speak with someone about the *Harlem DNA Lab*, please call (516) 367-5170 or email dnalc@cshl.edu.

What:

Lab field trips for high school students
Professional development for
8th – 12th grade science teachers



Who:

To make a reservation for a high school lab field trip, contact:

Mary Lamont (516) 719-1296

For information about the *Teacher Professional Development Program*:

Amanda McBrien (516) 367-5175

Introducing

Harlem DNA Lab

on First Avenue at 120th Street

a collaboration of the

New York City
Department of Education
and

Dolan DNA Learning Center
Cold Spring Harbor Laboratory

Supported by:

Howard Hughes Medical Institute
The Jerome L. Greene Foundation
The Goldman Sachs Foundation

Student Lab Field Trips

High schools throughout New York City are invited to the *Harlem DNA Lab* for half-day lab field trips. Each lab is inspired by techniques and tools currently in use by research scientists. The experiences embody key concepts and process skills of the New York City *Scope and Sequence for Science*, NY State Science Core Curriculum, and National Science Education Standards, and complement Living Environment and Advanced Placement Biology coursework.

Select individual or a series of labs for 10th – 12th grade science classes from the following:

Biotechnology These experiments, which are required for AP Biology students, introduce key methods for manipulating DNA and transferring genes between living organisms.

- *Bacterial Transformation* (2½ hours) Students genetically engineer the bacterium *E. coli* to uptake genes for antibiotic resistance and bioluminescence.
- *DNA Restriction Analysis* (3½ hours) Students use restriction enzymes to cut DNA and analyze the resulting DNA fragments by agarose gel electrophoresis.

Human DNA Variations These experiments allow each student to safely prepare a sample of DNA from their own cheek cells and use polymerase chain reaction (PCR) to analyze different regions of their own DNA.

- *Genotyping a Human "Jumping Gene"* (3¾ hours) Students use a DNA chip to generate their own molecular

genotypes and use class data to study population genetics, Hardy-Weinberg equilibrium, and theories of human evolution.

- *Forensic DNA Profiling* (3¾ hours) Students use a DNA chip to investigate a highly polymorphic marker, use population genetics to calculate the frequency of their genotype, and learn how this analysis relates directly to forensic DNA identification.
- *Human Mitochondrial Sequencing* (3¾ hours) Students prepare their own DNA for sequencing at the CSHL Genome Center, then compare their DNA sequences to modern and ancient humans to discover the DNA evidence for human evolution.

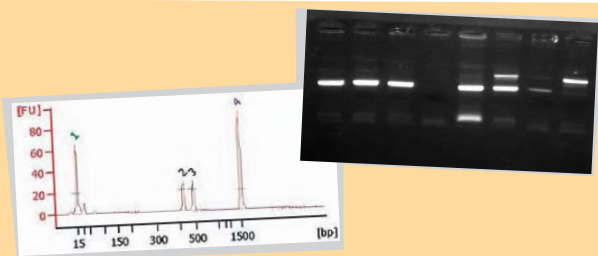
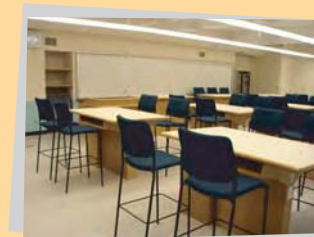
Teacher Development in Genetics & Biotechnology

With funding from the Howard Hughes Medical Institute (HHMI), the teacher professional development program will reach 820 New York City science faculty over five years. The program will train 8th through 12th grade teachers to implement activities to complement the NYC *Scope and Sequence*, life science, Living Environment, and AP Biology curricula.

Certificate Training (24 hours) provided during the academic year or summer will provide in-depth experience with six labs that "target" key topics in genetics and biotechnology:

- Mendelian Genetics
- Mutations and Variability
- DNA Transformation and Protein Isolation
- DNA Structure and Isolation
- DNA Analysis and Forensics
- PCR and Human DNA Variation

Training will provide conceptual context and connections to New York-based science research, lab planning and



preparation, and classroom implementation. An online *Lab Center* accompanies each lab with pre- and post-lab activities, video interviews and animations, and a teacher portal to share lab write-ups and teaching tips. Participating schools can check out an equipment footlocker and reagent/supply kit that support each targeted experiment.

Leadership Training (60 hours) during the summer will provide follow-up and recognition to elite teachers who can implement advanced genetics, biotechnology, or research electives – or support DOE's required 8th grade exit research projects. The workshop will sample molecular and genomic analysis in humans and in key model systems (*E. coli*, *C. elegans*, and plants).

Certificate and leadership training is provided by expert DNALC staff, and is offered free-of-charge to participating teachers. Professional development credit or stipend will be provided upon completion.

Detailed information on the *Teacher Development Program* is online at www.dnalc.org/harlemdnalab.