

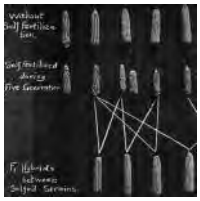


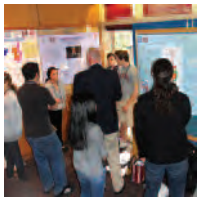


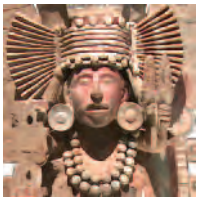

2009
Annual Report

Dolan DNA Learning Center

Expert Advisors and Corporate Support

We are lucky to have high-level support from two advisory bodies: the Dolan DNA Learning Center Committee and the Corporate Advisory Board (CAB). The DNALC Committee consists of community leaders and members of the CSHL senior management and Board of Trustees, who oversee strategic development, including capital funding and the evolution of satellite locations in North America and beyond. The CAB provides liaison to the Long Island and New York City business communities; its annual fund campaign and golf tournament contributed $225,000 in 2009.

DNALC Committee
Chairperson: **Laurie Landeau, VMD**, Trustee, CSHL

Edward A. Chernoff, President, Motors & Armatures, Inc.
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Marianne Dolan Weber, Chairman, Dolan Foundations

Cold Spring Harbor Laboratory Ex-Officio Members

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David A. Micklos, Executive Director, Dolan DNA Learning Center
Bruce Stillman, President and Chief Executive Officer
Karen Orzel, Senior Development Officer

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CSHL Trustee Liaison: **Laurie Landeau, VMD**

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Robert Isaksen, Bank of America
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Patricia Petersen, Daniel Gale Sothebys Real Estate
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William D. Roche
Raju Sarwal, M.D.
Charles R. Schueler, Cablevision
Lee Shuett, Nikon Instruments
Kurt Timmel, Marsh USA
Jeffrey K. Tupper, U.S. Trust Company of New York
Robert Van Nostrand
Hans Zobel, Ziehm Medical LLC

DOLAN DNA LEARNING CENTER EXECUTIVE DIRECTOR'S REPORT

Preparing students and families to thrive in the gene age

ADMINISTRATION

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Valerie Meszaros
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Karen Orzel
Carolyn Reid

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Eun-Sook Jeong
Susan Lauter
Jason Williams
Chun-hua Yang

On November 20, research teams from the United States and Mexico published the complete maize genome—the entire set of genetic information belonging to the plant better known to us as corn. Anticipating this event for the launch of a new Internet site, *Weed to Wonder*, a videography team from the DNALC went to Mexico to get the story behind the research and put the genome sequence into the context of the history of maize cultivation. First, we traveled 70 miles south of Mexico City to the Balsas River Valley, where an old man led us up a shock-breaking road and along an obscure path to a rock shelter from the dawn of maize cultivation. Eight months previously, microscopic analysis of grinding stones from this site revealed traces of cultivated maize that date back 8700 years. This is almost as old as the earliest evidence of wheat cultivation in the Fertile Crescent. The grinding stones found in the shelter were nothing fancy—just rounded river stones—but they would have been effective enough at making a rough corn meal. Combined with water, this would have made a simple porridge or a dough from which to fashion the quintessential Mexican staple, the tortilla.

An elderly guide leads Jason Williams, Eun-sook Jeong, and Dave Micklos—with cameras and tripods in tow—to the site of the shelter where maize grinding stones were discovered. Dave then speaks on camera about the location.

Just below the shelter, we passed a tiny, unkempt corn field very much like the field, or perhaps even the same field, from which the ancient agronomists had harvested their maize. Somewhere nearby, Teosinte, the wild ancestor of modern maize, would have been brought under cultivation. Genetic analysis has placed the Balsas River subspecies of Teosinte at the root of the "tree" leading to all modern maize. However, the food potential of Teosinte would not have been immediately obvious, because its kernels are covered with a flinty, inedible outer covering. In the 1930s, Nobel laureate George Beadle demonstrated how Meso-Americans could have first exploited Teosinte as food. He showed that its kernels explode when heated, casting off their flinty coats and leaving behind edible little puffballs. Teosinte was almost certainly eaten as popcorn, making it the world's first and most enduring junk food.

The ancient farmers would have identified stands of Teosinte that made the biggest and best-tasting popcorn. Eventually, they would have had the idea to plant seeds from some of the best plants in fertile soil on the banks of tributaries of the Balsas. In watching the cultivated Teosinte year after year, they would have selected odd plants—less bushy ones that made harvest easier and, of course, those with larger cobs and less-flinty kernels. For some time, they would have continued to eat the cultivated maize as popcorn, but eventually, they would have discovered the varied uses of ground maize meal. This is the evidence provided by millstones from the humble shelter in the Balsas River Valley.

At the International Maize and Wheat Improvement Center (CIMMYT), we visited Suketoshi Taba, who leads the effort to conserve as many types of cultivated and wild corn as possible. The cold storage vaults of his germplasm bank contain 26,000 varieties of maize seed, the products of thousands of years of human-directed evolution. Represented in this germplasm bank are ~60 indigenous races of Mexican maize—each as genetically distinct from one another as humans are from chimpanzees. Frequent exchange of genes with wild Teosinte, which grows as a "weed" in cultivated maize fields, has been a major source of this fantastic genetic diversity.

In Irapuato, 200 miles northwest of Mexico City, we visited the National Laboratory of Genomics for Biodiversity, an immaculately modern facility designed to take Mexico into the genome-sequencing club. There, we interviewed Luis Herrara-Estrella, its director, and Jean-Philippe Vielle-Calzada, who headed their effort to sequence the genome of the maize race called Palomero. They used so-called next-generation sequencing to rapidly generate data on millions of short genome pieces. Then, they "scaffolded" their fragmentary data onto a genome completed by traditional methods by a U.S. team that included CSHL researchers. Vielle-Calzada,

Above: Teosinte seed.
Right: Suketoshi Taba discusses one example of maize seed stored in the germplasm bank.

Pyramid of the Moon, Teotihuacan (left). Eun-sook Jeong, Jason Williams, Dave Micklos, and Jaime Padilla (the guide for the trip) pose in front of Nevado de Toluca.

who spent his postdoctoral period at CSHL, explained that the sequencing of the Palomero genome was simplified because it is ~20% smaller than the B73 cultivar sequenced by the American team. Palomero, with its miniature cob, is one of most ancient of Mexican maize races cultivated as popcorn. A comparison by the Mexican team turned up long stretches of identical DNA sequences shared by the Palomero and B73 genomes. Contrary to the overall sequence differences that arose as maize diversified into different races, these regions must have been strongly selected early in the domestication process and then passed on to all maize races. Close examination revealed that several of these regions contain genes that detoxify heavy metals from the environment, such as cadmium and copper.

With this knowledge, we set off on a jarring 15-mile trip on an unsurfaced road and then a lung-aching hike that took us to pass at 14,000 feet on Nevado de Toluca, a volcanic caldera southwest of Mexico City. One of its Aztec names, *Lord of the Cornstalks*, is appropriate to this story because it looks down on the fields of the Balsas River and is only ~50 miles away from the shelter where we started our exploration. The Toluca volcano erupted most recently ~10,500 years ago, carpeting the region with ash and debris. This coincides closely with the early cultivation of maize and provides a context for interpreting the conserved metal decontamination genes found by Vielle-Calzada. Prior to industrialization, volcanic eruptions were the major source of heavy metals in the soil, and it appears that the cultivation of maize selected for plants that were tolerant to the metallic soils in this region.

Maize gods and goddesses are central icons of every pre-Columbian culture of Mexico, including Mayan, Toltec, Zapotec, Mixtec, and Aztec. There was good reason for this veneration and for the widespread notion that they were "children of the corn." The large-scale cultivation of maize made possible the numerous and vast pre-Columbian cities and the cultures that flourished around them. North of Mexico City, Teotihuacan was a city of 100,000 residents that rose to greatness 2000 years ago. Ears of Palomero maize have been found in graves there. To the east, Cacaxtla was a ceremonial center founded by Mayan settlers. Set atop a towering pyramid, archeologists are still busy excavating one of the most extensive troves of polychrome murals in the ancient world. There, we saw a mural that is perhaps most emblematic of the Native American view of maize and human life, a corn plant in which human heads burst forth from ears of corn along the axis of the stalk. In Mexico, the cultivation of maize is so wrapped up in human history that it is difficult to draw a line between the plant and the people who brought it under domestication.

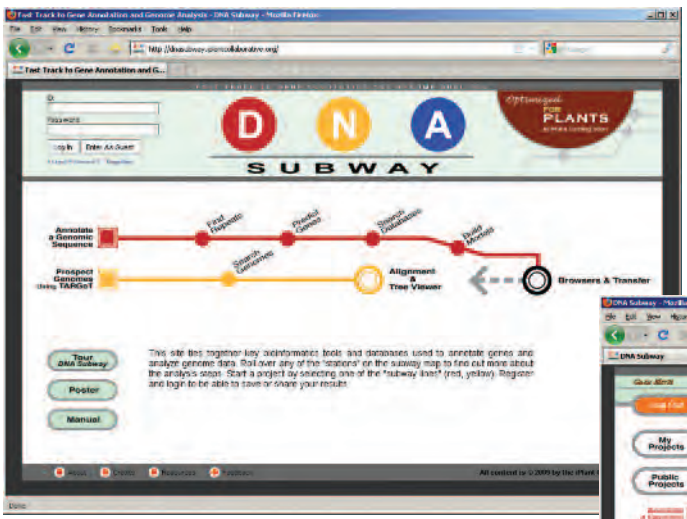
The *Weed to Wonder* Internet site grew out of a collaboration between CSHL's Dick McCombie and Doreen Ware, and Rick Myers of Washington University in St. Louis, to develop a mini-website describing the National Science Foundation (NSF)-funded Maize Genome Sequencing Project. New funding through an NSF project on maize meristem, run by CSHL researcher Marja Timmermans and Mike Scanlon at Cornell University, is allowing us to build a substantial website that explores how humans transformed the common weed, Teosinte, into the modern agricultural wonder we know as corn. In addition to a podcast on our Mexican journey, we developed two additional

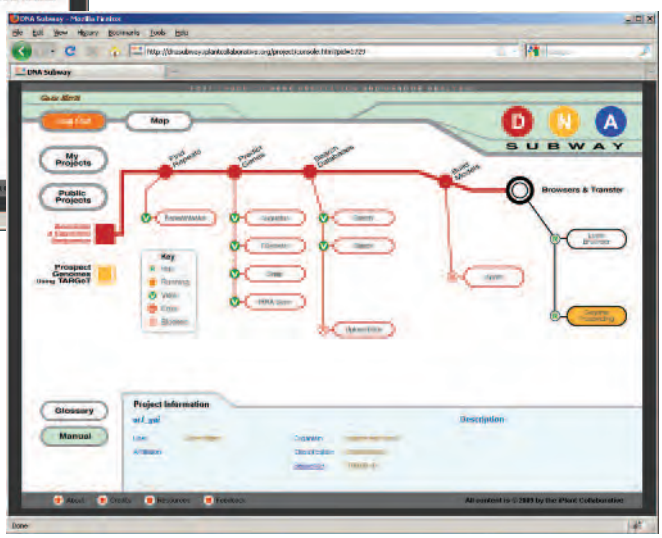
podcasts with scientists describing CSHL's special connection to the project. Another production was an historical recreation of CSHL in 1909, with George Shull explaining his experiment on hybrid vigor that is the foundation of all hybrid corn grown today. The website includes animations describing the different DNA-sequencing approaches used by the American and Mexican teams and a video tour of the Genome Sequencing Center at Washington University in St. Louis. A virtual exhibit on the life of Nobel Prize–winner Barbara McClintock includes many artifacts from her lab at CSHL, where she discovered transposons (so-called "jumping genes"). An online lab notebook allows students to do experiments in maize genetics and to detect one of McClintock's transposons in corn.

iPlant Collaborative

In 2009 we continued to contribute to the *iPlant* Collaborative (*iPlant*), a consortium headed by the University of Arizona and CSHL to develop a computer (cyber) infrastructure to support plant research. Funded by the National Science Foundation (NSF), *iPlant* aims to develop tools and interfaces that will provide scientists with easy access to large-scale plant data sets and high-powered informatics tools. Following a year of input from the plant science community, *iPlant* announced in April that it will build "discovery environments" to help plant scientists solve two "grand challenges": (1) to produce an *iPlant* tree of life (*iPTOL*) encompassing ~500,000 plant species and (2) to explore the genotype to phenotype continuum in plants (*iPG2P*).

As a member of the *iPlant* Education, Outreach, and Training (EOT) component, the DNALC is working with the grand challenge teams to create educational interfaces for the computing tools and data sets available in each discovery environment. In this way, students and teachers can work with the same data and use the same tools at the same time as high-level plant researchers. Students may literally look over the shoulders of plant researchers as they, for example, understand the mechanisms that could enable crop plants to rapidly respond to global climate changes.





In advance of setting the two grand challenges, the DNALC embarked on an EOT demonstration project to construct a *DNA Subway*—an educational platform for gene annotation and compari-

son. This effort leverages the DNALC's previous experience in developing community workspaces and simple bioinformatics interfaces, such as *Sequence Server* (www.bioservers.org) and *Gene Boy* (www.dnai.org/geneboy/index.html). The project coordinated contributions from 25 scientists, computer programmers, and bioinformaticians at 12 institutions including Scott Cain (Ontario Institute for Cancer Research), Tuajuanda Jordan (Howard Hughes Medical Institute), Zhenyuan Lu and Anthony Biondo (CSHL), Sally Elgin (Washington University in St. Louis), Susan Singer (Carlton College), Ann Stapleton (University of North Carolina, Wilmington), and Sue Wessler (University of Georgia).

We used the metaphor of a subway map as an intuitive and appealing interface to sophisticated informatics tools. "Riding" on any of three different lines of the *DNA Subway*, users can analyze up to 100 kb of DNA—predicting and annotating genes (Red Line), prospecting for related genes (Yellow Line), and analyzing next-generation transcriptome data (Blue Line). The first line installed, the Red Line, allows users to (1) predict repeat DNA, genes, and tRNAs, (2) gather supporting RNA and protein evidence, (3) make and edit gene models in a graphical annotation editor (*Apollo*), (4) view the assembled data in stand-alone browser, and (5) export to a community browser to view their assembled data in the context of a completed genome (*Phytozome*). Work can be saved to a personal profile for later use or to share with other users.

In June, we coorganized a meeting at Washington University, St. Louis, to inform our development efforts. The 3-day workshop, *Genomics in Education: Gene Annotation and Comparison*, brought together 44 participants representing three worlds (genome research, education, and computer science) working in three biological systems (microbes, plants, and animals). Presentations emphasized the importance of research partnerships in which students are welcomed as coinvestigators. They also highlighted students' desire for a wet-bench hook to anchor abstract bioinformatics investigations. A clear message was that biology educators need to scale-up from local experiments that involve a single class to distributed experiments in which classes around the country contribute to and analyze common data sets.

Informed by the consensus developed at the *Genomics in Education* meeting, by year's end, we began organizing two distributed research projects for *iPlant: Chloroplast Gene Sequencing* and the *Orphan Data Project*. The *Chloroplast Gene Sequencing* Project will allow students to analyze sequences to determine phylogenetic relationships between plant groups or to show regional variation within a species (ecotypes). Analyses will be based on so-called DNA "bar codes," short regions of DNA sequence that uniquely identify different plants. Although sequence from the mitochondrial gene *cox1* (cytochrome *c* oxidase subunit 1) is universally used to bar code animals, the plant world has settled on sequences from two chloroplast genes, *rbc*L (ribulose-bisphosphate carboxylase) and *mat*K (maturase K).

Students first work with a plant taxonomist or ecologist to identify interesting local plants whose sequences have not yet been submitted to major bar-code databases. In the classroom, students isolate plant DNA and use polymerase chain reaction (PCR) to amplify the bar-code region from their selected plants. The student DNA samples are shipped to a sequencing center, where the finished sequences are uploaded into a database at the *iPlant* Internet site. Students access their sequences and use them as a starting point in a study of plant phylogenetics or diversity using alignment and tree-drawing tools on the *DNA Subway*. Ultimately, they can submit high-quality sequences to the Bar Code of Life or other scientific databases. This effort will be informed by our existing *DNA Sequencing Service* and *BioServers* Internet site, which provide sequencing and analysis tools for human mitochondrial DNA.

The *Orphan Data Project* will support distributed research projects in the data-rich world created by next-generation sequencing and high-throughput phenotyping. The objective is to create an online "marketplace" to connect faculty and students with researchers who have novel data sets to be analyzed. The site will provide an index of projects with descriptions of available data and suggestions for how they can be used for class or independent research projects. The site will also include

networking tools—analogous to a Facebook "wall"—to allow collaborators to coalesce around each data set. Partnership Coordinator Jason Williams will facilitate data submissions and "matches" between researchers and interested parties.

Many types of orphan data can be analyzed using the tools available at the *DNA Subway* and *iPlant* discovery environments. Notably, gene mutation and expression data will readily articulate with the genotype to phenotype grand challenge. We expect that college faculty will seek out data related to their doctoral or postdoctoral studies, potentially providing projects with additional high-level coinvestigators. The Internet is an ideal instrument to identify small communities of interest in a given data set, which would function autonomously from *iPlant*. We expect that some larger communities will reach a threshold at which they might be adopted as formal *iPlant* education projects, and regional workshops will provide venues to share collaborative results.

Landeau Multimedia Studio

In December 2008, *Cable Network News* (*CNN*) eliminated its entire science, technology, and environmental news staff. In March 2009, The *Boston Globe* eliminated its 25-year-old science section. Only 35 of 95 weekly science newspaper sections have survived since their heyday in the late 1980s. In a recent survey of science journalists by *Nature* magazine, 29% said their publications had cut science-writing staff in the past five years. A 2009 survey by the Pew Research Center found that only 20% of adult Americans read science magazines; this is about the same proportion that are considered sufficiently scientifically literate to be able to understand the science section of *The New York Times*. Despite the grim statistics for print science journalism, 67% of respondents in the Pew study said they regularly watch science channels and programs, such as the *Discovery Channel* and *NOVA*. According to Nielsen, the *Discovery Channel* is among the most-watched cable channels.

Somewhere between the waning reach of "hard science" news and the appeal of popular "science lite" lies a *niche* for informed and entertaining television coverage. With its strong background in Internet multimedia, proximity to CSHL's high-caliber research, and ready access to the flow of 8000 thought leaders in biology who annually attend CSHL meetings, the DNALC is well positioned to occupy this middle ground of television science. We believe that locating a television production team *within* a prestigious scientific community can provide a general model for how science organizations can leverage local expert knowledge to produce high-quality science programming. In this way, universities, research institutes, and science centers can help fill the vacuum created as the mainstream mass media retreat from science coverage.

The completion of the *Laurie J. Landeau Multimedia Studio* has provided us with the physical resources needed for high-level video production. During the year, we demonstrated capabilities of the studio's theatrical lighting and sets by producing video in a number of different formats. In addition to interviews for our *Genes to Cognition Online* and *Weed to Wonder* Internet sites, we completed news podcasts on several topics: an anthropology series on ancient hominid fossils "Ida," "Ardi," and Neanderthal; the Nobel Prize in Physiology or Medicine; and the completion of the maize genome.

We are now working to come up with concepts and funding mechanisms that will enable the DNALC to partner with PBS and cable channels to produce high-quality television programs. Talks with Robert Krulwich of ABC News and WNYC's *Radio Lab*, and Laura Savini, of WNET.ORG, helped crystallize one concept for an inquiry-based program that shows how DNA

James Watson provides perspective on the role maize has played in CSHL's history for a *Weed to Wonder* podcast.

solves real problems in modern life. Equal parts talk show, cooking show, and investigative report, each episode will take the audience inside an interesting "detective case." Although it will build on popular interest in *Crime Scene Investigations* (*CSI*), the show will explore how modern science can solve a range of interesting, everyday problems. The program will employ a young, "perky-quirky" host who begins each exploration at the studio coffee table brainstorming with CSHL scientists about how to solve a real-world problem. (The host and scientists are "the DNA detectives.") Taking to the field, the host personalizes the problem by interviewing people and gets experimental ideas by visiting the lab of a scientific expert. Then, it's back to the studio lab, to "cook up" a real experiment with the help of the detectives. The experiment will answer the question at hand and also point to solutions for similar problems.

For example, a recent exposé found that many restaurants substitute tilapia and other inexpensive fish for premium fish, such as red snapper, white tuna sushi, and Chilean sea bass. In this case, the DNA detectives would follow several New York families into restaurants and interview them while they order a premium fish. The detectives then take samples back to the studio to run DNA tests to determine exactly what sorts of fish are on the menus. Other questions the DNA detectives might tackle include: Do perfume testers smell better than me? Is my certified organic food genetically modified? Which top chef has the best sense of taste? How can DNA set free a convict on death row? Where did that illegal elephant tusk come from? Is it safe for me to take that drug? Am I related to a Neanderthal? How do they find a good mate for a zoo animal? Is my all-beef hotdog all beef?

Genes to Cognition (G2C) Online

Our latest, largest, and most interactive website, *Genes to Cognition* (*G2C*) *Online* (www. g2conline.org), launched on March 15, coinciding with the beginning of the Dana Foundation's Brain Awareness Week. *G2C Online*, which is supported by the Dana Foundation and Hewlett Foundation, features a rich library of more than 750 animations, articles, demonstrations, and interactive experiments about neuroscience in the 21st century. It is modeled as a small world network, where each content item is a node in a web of interactive media. By exploring nodes at any of six levels of analysis—genes, biochemicals, cells, brain, cognition (behavior), and the environment—students can understand that thinking and disorders of thinking can be approached on multiple levels. Six major psychiatric disorders form the hub of the *G2C Online* network: ADHD, autism, Alzheimer's disease, bipolar disorder depression, and schizophrenia. Students can learn the fundamentals of neuroscience through a series of narrated animations, conduct interactive experiments using real-world experimental data, and browse a library of video interviews with leading researchers, including Nobel laureates Eric Kandel and James Watson.

The most searched-for feature is the *3D Brain*, an interactive brain map that allows users to rotate the brain in three-dimensional space. Created in collaboration with *AXS-3D*, a Toronto-based animation studio, *3D Brain* includes individual maps of 29 substructures with information on brain damage, case studies, and links to modern research. We collaborated with Jens Egeblad, brother of CSHL's Mikala, to create *3D Brain*, the DNALC's first iPhone application. Launched on September 20, the *3D Brain* app has become a staple in *Apple*'s Education Top-10, peaking at some 20,000 weekly downloads. By year's end, it had been downloaded 159,380 times to users in 70 countries and was the highest-rated app in the Education Top-25. *3D Brain* is free to download from *Apple*'s iTunes and the App Store.

The *G2C Online* project will culminate in 2010, with a large-scale study of how the site is used in classroom settings. Twelve high school and college educators and their 700 students will participate in a quasi-experiment, which uses matched experiment and control groups. Each teacher will use the site with two classes they teach. One class will use *G2C Online* to learn about a selected topic (e.g., autism) and use traditional resources to learn about another topic (e.g., schizophrenia). A second class will do the reverse: Use traditional sources to learn about autism and *G2C Online* to learn about schizophrenia. Using classes taught by the same teachers, controls for the level of background and "scaffolding" that accompanies each topic, while "flipping" the assignments controls for class differences. As well as completing teacher-authored assessments, students will also complete a number of instruments designed to assess science literacy and general knowledge of neuroscience. In this way, we hope to find out if *G2C Online*, and its unique network structure, helps students conceptualize "ideas" in science.

Internet Visitation and Development

Although the number of visits to the DNALC's family of Internet sites in 2009 held constant at six million, visitors consumed 23% more information than in 2008. Nearly 5 terabytes (5000 gigabytes, GB) of data were served, with *DNA Interactive* reaching 1365 GB for the year. Two new sites were added in 2009. *Genes to Cognition* (*G2C*) *Online* launched in March, and *Weed to Wonder* launched on November 20 to coincide with the publication of the maize genome sequence in the journal *Science*.

We continued with a series of interventions to update our websites and to drive visitation. This included search engine optimization to make our sites more visible to *Google* and other search arbiters. We devoted considerable effort to redevelop the DNALC home page, which provides information about our educational programs and is a portal to our 14 content sites. The former home page was built in the media integration program *Flash*, which provided a sleek design but hid some content from search engines. The new design uses HTML pages formatted with cascading style sheets (CSS). The HTML pages are readily searched, and CSS enables us to rapidly update the site.

Periodically "freshening" sites with new content encourages visits from search engines indexers, which can improve page rank in search results. Notably, we added blogs to six of our major content sites: *Genes to Cognition Online, Inside Cancer, DNA Interactive, Eugenics Archive, DNA from the Beginning*, and *Your Genes, Your Health*. On a regular basis, DNALC staff members provide their own perspectives on current news and discoveries that connect with website content. Blog visits totaled 32,066 in 2009. We have also broadened DNALC exposure by creating *Twitter* and *Facebook* pages.

We increased access to our high-quality video content under our own *DNA Today* banner and through the *YouTube* channel. We posted 82 videos on *YouTube* over the course of 2009 resulting in nearly 42,000 video views, more than half of the total views (76,213) since we started *YouTube* postings in May 2007. The majority of viewers found our videos by searching *YouTube* (29%) or by following a link from another video page (30%); perhaps surprisingly, only 5% of *YouTube* views were initiated by Google searches. *Cell Signals*, a three-dimensional tour through a cell, comprised

	Average visit length	Change from 2008	Average monthly bandwidth (GB)	Change over 2008	Visits in 2009	Change from 2008 (%)
Content sites						
Blogs (G2C 3/09, others 8/09)	10:21	n.a.	1.86	n.a.	32,066	n.a.
DNA from the Beginning	12:49	+3:17	29.74	–7.35	1,180,507	–9.34
DNA Interactive & myDNAi	10:26	0	113.73	+2.17	1,046,656	–9.07
Dolan DNALC Home	10:05	+0:52	134.27	+39.5	1,623,778	–0.34
Genes to Cognition Online (3/15)	8:34	n.a.	44.39	n.a.	186,574	n.a.
Image Archive on the American Eugenics Movement	14:04	–3:42	17.57	+6.02	687,515	+13.08
Inside Cancer	9:48	+2:30	29.30	–2.05	187,311	–21.93
Inside Cancer Teacher Center	10:53	–3:08	0.54	–0.49	86,707	+289.68
Your Genes, Your Health	7:55	–0:17	37.99	–3.46	691,320	–14.19
Weed to Wonder (11/20)	18:46	n.a.	37.55	n.a.	16,277	n.a.
Laboratory/bioinformatics sites						
BioServers	20:11	–3:56	2.57	+ 0.01	100,929	–25.76
DNALC Kits/Carolina Collaboration	9:11	–6:07	0.66	–1.68	8,910	+64.24
Dynamic Gene	9:45	+2:27	0.34		15,514	+37.57
Genetic Origins	6:38	–0:50	1.53	–0.04	102,163	–0.66
Greenomes	3:34	+0:19	0.47	–0.07	17,317	+30.09
Silencing Genomes	11:01	–1:44	0.54	–0.01	38,913	+32.08
All sites	**10:54**	**+1:27**			**6,022,457**	**–0.62**

57% of *YouTube* views, followed by The Neanderthal Genome Project, an interview with Svante Pääbo, at 10%. *YouTube* reports that our audience is largely male (62%) and between 45 and 64 years of age (53%), highlighting a need to attract female and younger viewers.

As part of the National Science Digital Library Project, we completed a 4-year project to develop a database of virtually all of the DNALC's proprietary multimedia content. This content management system constitutes a digital card catalog that allows any item to be readily searched using a large set of fields. Indexing 727 items from our first site, *DNA from the Beginning*, brought to 5380 the total number of animations, videos, images, photographs, and other items in our content management system. All of these items were "harvested" to the BioScieEdNet (BEN) digital library, composing more than one-third of the 15,319 resources available at this NSF-supported portal (www.biosciednet.org). The DNALC home page incorporates a new search interface that searches all of these items, an increasing number of which can be downloaded to personal computers.

We continue to get a visitation boost from *Google AdWords*, a grant program that provides free "sponsored" links in the right-hand-side "advertising gutter" on *Google*'s search results page. The *AdWords* account contains a set of keywords for each DNALC website. When someone searches for one of the keywords, an ad for the site is displayed and logged as an "impression." A "click-through" is logged when the link is followed, resulting in a visit to one of our sites. *DNA from the Beginning* is our most successful site on *AdWords*, with 57,254 visits from 3,557,433 impressions. Not surprisingly, 86.6% of click-throughs resulted from a search for "DNA." *Genes to Cognition Online* reaped 55,025 visits from 4,949,401 impressions—73% were searches for "brain." All DNALC sites received a total of 140,201 visits from 13,128,457 *AdWord* impressions. The relatively low conversion rate (from impression to click-through) is probably due to the fact that users of free content, such as teachers and students, generally concentrate on free listing rather than sponsored ads. The rankings of free listings also give a measure of the authority of the link, and DNALC sites are frequently among the top five returns for many key search terms.

Faculty Training

During the year, more than 1200 educators participated in a range of professional development activities conducted at *Harlem DNA Lab* and at 19 sites around the United States and Asia. Through our collaboration with the New York City Department of Education, sponsored by the Howard Hughes Medical Institute, 312 teachers participated in workshops at *Harlem DNA Lab,* including 37% underrepresented minorities. With funding from the NSF, National Institutes of Health (NIH), and the Hewlett Foundation, we collaborated with host institutions to conduct 37 workshops on cancer biology, RNA interference (RNAi), and neurobiology. Seven workshops were conducted at institutions with high proportions of underrepresented minorities, where 20% of participants were African American or Hispanic. Overall, 12% of the 590 participants at off-site workshops were underrepresented minorities. An additional 319 educators attended workshops or presentations at professional meetings, which covered topics including neurobiology, bioinformatics, detecting GM foods by PCR, DNALC online tools for education, and DNA forensics. One workshop was held at Ho Yu College in Hong Kong as part of the inauguration of *MobileLab*, an impressive biotechnology bus developed by our friend William Mak.

With Phase II funding from NSF's Course, Curriculum, and Laboratory Improvement (CCLI) program, we continued our efforts to bring compelling RNAi experiments into college classrooms. A total of 126 college faculty participated in week-long workshops and weekend follow-ups that cover a range of RNAi experiments in *Caenorhabditis elegans*, a simple roundworm that is a model eukaryotic system. After observing mutant phenotypes and learning basic worm "husbandry," faculty learned simple methods to induce RNAi and then learned "single-worm PCR" to examine the mechanism of RNAi, comparing the DNA of worms with identical phenotypes induced by either RNAi or a mutation. They also learned methods to support student projects, such as using bioinformatics to identify a target gene and developing their own RNAi reagents "from scratch." The *Silencing Genomes* Internet site (www.silencinggenomes.org), which has received more than 80,000 visits, includes all experiments and reagent recipes. A free-strain library includes all needed bacterial and *C. elegans* strains, as well as more than 100 vectors developed by workshop participants to silence worm homologs to human genes. To date, more than 1300 strain orders have been filled and used with a reported 6000 students. Three stand-alone kits derived from the program will be released by Carolina Biological Supply Company in 2010.

With Phase II funding from an NIH Science Education Partnership Award (SEPA), we continued to improve and disseminate *Inside Cancer* (www.insidecancer.org), a multimedia Internet resource for understanding the molecular genetic basis of cancer. By focusing on how researchers gain

Faculty Workshop Sites 2009

Silencing Genomes, Inside Cancer, and G2C Online: Virginia Tech, Blacksburg

Inside Cancer and G2C Online: Arizona State University, Tempe; Contra Costa Office of Education, Pleasant Hill, California; Great Bay Community College, Portsmouth, New Hampshire; *Harlem DNA Lab*, New York; John Jay College of Criminal Justice, New York; Madison Area Technical College, Madison, Wisconsin; Oxnard College, Oxnard, California; Raritan Valley Com- munity College, Somerville, New Jersey; Tulsa Community College, Tulsa, Oklahoma; University of Colorado, Denver

Silencing Genomes and Inside Cancer: Houston Community College Northwest, Houston, Texas; Howard University, Washington, D.C.; North Carolina A&T University, Greensboro; St. Louis Science Center, Missouri

Silencing Genomes: Austin Community College, Austin, Texas; California State University, Domin-guez Hills

Inside Cancer: Bossier Parish Community College, Bossier, Louisiana; Illinois Institute of Technology, Chicago; Minneapolis Community & Technical College, Minneapolis

insights into the unseen world of genes and signaling molecules, *Inside Cancer* provides examples of the science process while engaging students with this relevant topic. A total of 314 high school and college faculty attended 1-day workshops at 18 sites around the nation, learning how to use *Inside Cancer* to enhance teaching of cancer cell biology in health, general biology, and advanced biology classes. Responding to feedback from workshop participants, five Faculty Fellows spent 3 weeks in residence at CSHL creating lessons and improving *Inside Cancer* content: Margaret Witecki (Mount Vernon High School, Washington), Wendy Wooten (High Tech Los Angeles High School, California), Lisa Orenstein (The Overlake School, Redmond, Washington), Robin Cochran-Dirksen (Lead-Deadwood High School, South Dakota), and Greg Ballog (South Whidbey School District, Langley, Washington). With funding from the Hewlett Foundation, we continued to disseminate *G2C Online*. One-day workshops conducted at 11 sites drew 150 high school and college educators to learn how to use this unique learning resource.

We continued our long-term collaboration with the Singapore Ministry of Education when in December we hosted an attachment of four Singaporean primary teachers (grades 3–6). The visiting educators spent 2 weeks in Cold Spring Harbor, immersed in student programs and in small workshop sessions with DNALC middle school instructors. Over the course of their stay, the teachers focused on the Fun with DNA and World of Enzymes curricula and will share what they learned with colleagues in their respective schools.

Harlem DNA Lab

With the official opening of *Harlem DNA Lab* in fall 2008, we fulfilled our long-held goal of developing a base of operations from which to provide underserved schools in New York City (NYC) the same enrichment opportunities that we offer Long Island's schools. The NYC Department of Education renovated the 1200-square-foot facility, located in the John S. Roberts Educational Complex to our specifications and the Jerome L. Greene Foundation provided $100,000 of state-of-the-art equipment.

Core support from the Dana Foundation allowed us to aggressively ramp-up our student enrichment program to reach our target audience of underserved and disadvantaged students. In 2009, we provided lab field trips to 3183 middle and high school students, 78% of whom were African American or Hispanic. Eighty percent of students were provided scholarships courtesy of the William Townsend Porter Foundation, based primarily on Title One status (at least 40% of a school's student population is on free/reduced lunch program). Students came from 45 zoned, charter, magnet, and independent schools from throughout New York City.

We provided intensive enrichment to students from two schools housed with us in the John S. Roberts Educational Complex: the Coalition School for Social Justice and MS 45. Sixty Coalition students (grade 12) participated in a series of three biotechnology laboratories, and 375 MS 45 students (grades 6–8), participated in three genetics laboratories. A Coalition senior was recruited as our first student intern. In the spring, we participated in several programs for the World Science Festival (WSF), "a tribute to imagination, ingenuity and inventiveness that takes science out of the laboratory and into the streets, theaters, museums, and public halls of New York City." For *Pioneers in Science*, we worked intensively with immigrant students from Brooklyn International

Following a bacterial transformation, participants "painted" with *e. coli* in collaboration with NY artist Amy Chase Gulden at the World Science Festival.

High School to prepare for one-on-one interviews with Nobel laureate Harold Varmus during the Festival. At our booth at the *Street Fair* in Washington Square Park, Ileana Rios did DNA extractions with passersby.

In late fall, we announced a *Charter Membership Program* to provide intensive support to several independent schools as they develop a sequenced program of accelerated science opportunities for their teachers and students. An exclusive package of benefits includes in-school and laboratory field trips, summer camp programs, and professional development for teachers, all designed to bring science instruction up to par with the most advanced schools in the country. By year's end, Trinity School, one of the oldest independent schools in Manhattan, had made a 2-year commitment. We expect that the remaining membership will be filled early in 2010.

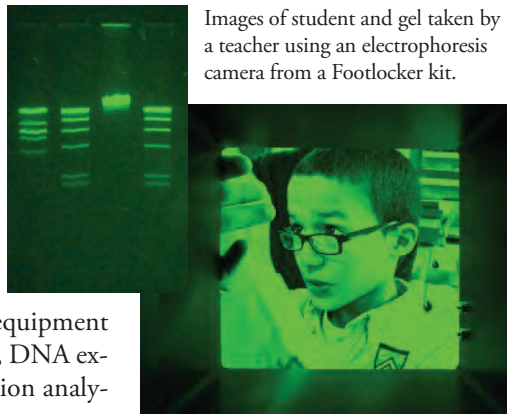
HHMI Training Program

Harlem DNA Lab is also the site of a professional development collaboration with the NYC Department of Education (DOE). Sponsored by the Howard Hughes Medical Institute (HHMI), the program aims to develop a strong base of teachers who can competently introduce six "targeted" experiments in genetics and biotechnology at identified points in required science courses. We worked intensively with DOE staff members and project advisors to introduce the training program to key opinion leaders in the educational system. During the second year of the project, we provided 612 training sessions (one teacher x 3–4 hours of lab training), fulfilling 77% of our ambitious 800-session goal. Fifty-eight teachers completed four sessions required for Certificate Training, and 378 teachers had taken one or more labs. Almost two thirds of training sessions were within our primary audience of 8th-grade *Scope and Sequence* teachers and 9th–10th-grade *Living Environment* teachers and included 35% African American and Hispanic teachers.

We also continued to work on two key project components that support classroom implemen-

DNALC educators provide video introductions to each *Lab Center* activity. Teachers can use *Lab Center* to prepare students before their visit and follow up afterwards.

tation: online *Lab Center* and experiment footlockers that support each of the targeted labs. *Lab Center* (www.dnalc.org/labcenter/harlemdnalab) provides multimedia guides for each lab, including video introduction, online lab notebook, animations, scientist interviews, teacher lesson plans, and prelab and postlab student work sheets. Teacher Fellows from around the New York metropolitan area continued to help the website evolve: Greg Borman (City University of New York), Caren Gough (New York State Science Mentor), Dr. Dahlia McGregor (South Shore High School), Adrienne Rubin (Eleanor Roosevelt School), Kathleen Rucker (Brooklyn International High School), and Jerry Watkins (Central Islip). The final phase will be to add a series of "New York Stories," video podcasts that link each experiment to notable work, past and present, done by researchers in New York area institutions.



Images of student and gel taken by a teacher using an electrophoresis camera from a Footlocker kit.

Our original proposal envisioned regional consortia of individual schools that would contribute funds to purchase shared footlockers. The recession had effectively ended this source of local funds, putting the footlockers in jeopardy. However, a grant of $75,000 from the Richard M. Lounsbery Foundation jumpstarted the program in October with the purchase of 14 footlockers made to our specifications. For a small restocking fee, teachers who have participated in professional development training or who have accompanied students on a field trip to the *Harlem DNA Lab* are invited to rent footlockers. Kits contain all equipment and materials needed for labs on DNA models, fruit fly mutations, DNA extraction, bacterial transformation, protein isolation, DNA restriction analysis, and human DNA variations.

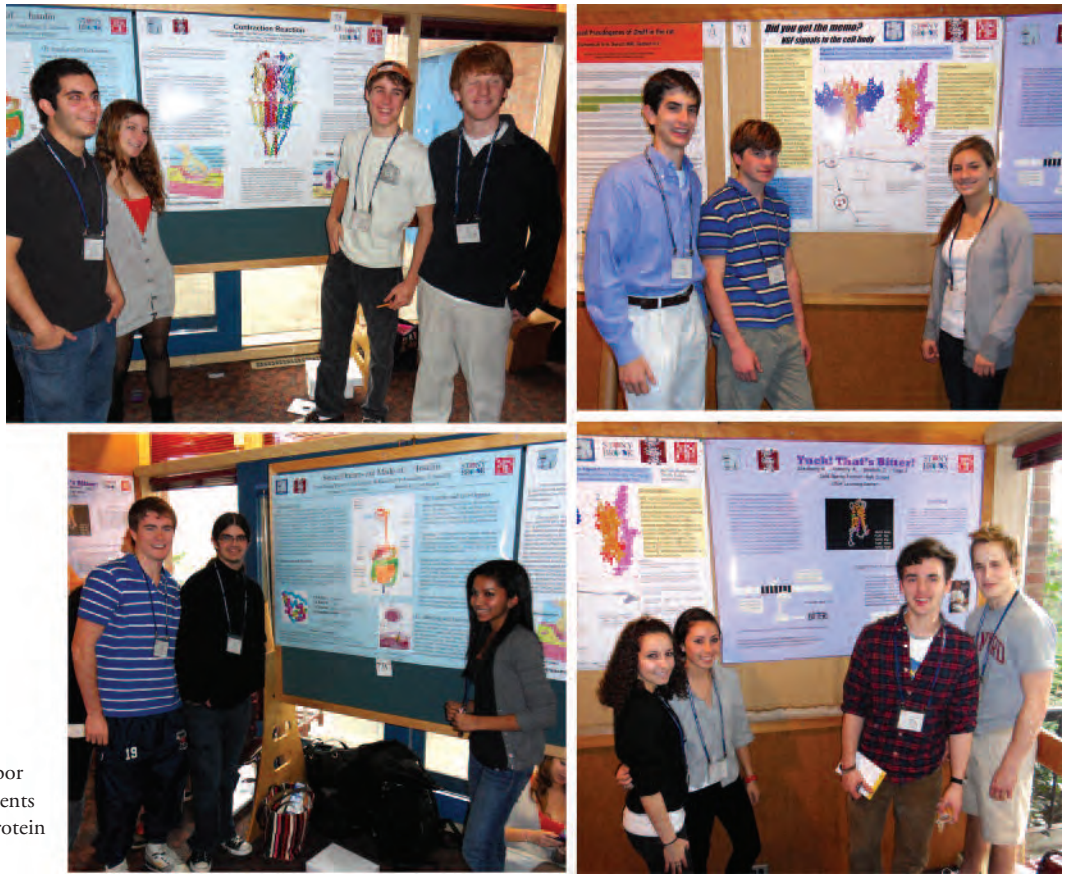
Student Instruction and Family Science

Annual visitation reached 47,798 in 2009. This included 21,031 students who conducted experiments at the DNALC, DNALC *West* or the *Harlem DNA Lab*, and 9450 students who received in-school instruction by DNALC staff members. About two-thirds of student visitors participated in *Genetics as a Model for Whole Learning* (*GMWL*), a program that is used to introduce genetics at 70 public and private schools. Bank of America and TD Bank provided scholarships for 2032 students from underserved Long Island schools.

Despite difficult economic circumstances, hard work by DNALC administrators and educators made the 2009 summer camps a great success. A record 932 students attended camps at the DNALC, DNALC *West, Harlem DNA Lab*, and in Wyandanch. A new online system simplified registration and saved administrative time by enabling parents to register and pay for camps, switch sessions, and cancel registrations on their own. Frequent ads in local papers, including *Nassau, Suffolk*, and *Big Apple Parent*, and large e-mail campaigns also contributed to the successful summer season. With the help of Jerry Watkins, a retired Central Islip science teacher and long-time friend of the DNALC, 12 students from Wyandanch High School participated in a 1-week *DNA Science* camp held in the most unlikely of places: the Wyandanch Public Library! Brookhaven National Laboratory provided stipends for all students, and the DNALC provided materials and reagents. In addition, Bank of America and the William Townsend Porter Foundation provided scholarships to 19 underrepresented minority or disadvantaged students who attended camps at the DNALC and DNALC *West*.

We continued the spring tradition, begun in 1985, of hosting *Great Moments in DNA Science*, a seminar series that honors the brightest local students. Three in-depth talks covered the gamut of research at CSHL and drew 271 participants: Dr. Eric Sawey, "Of Mice and Men: Using a Mouse Model to Identify Human Oncogenes"; Dr. Emily Hodges, "Using Massively Parallel Sequencing Technology and Genome Sequencing to Study Cancer Genomes"; and Dr. Stacy DeBlasio, "Illuminating Biology—The Science of Fluorescent-tagged Maize." *Saturday DNA!* continued its popu-

lar monthly run, with hands-on sessions for parents and children that feature the latest developments in the biological sciences. DNALC instructional, scientific, and *BioMedia* staff led 408 participants in programs on diverse explorations, including "Life up Close: Microscopic Worlds," "Personalized Medicine," and "Composting 101."



Cold Spring Harbor High School students pose with their protein posters.

CSH High School Partnership

In the spring, we graduated our third class of students from *Genome Science*, our partnership with Cold Spring Harbor High School (CSHHS). The year-long "capstone" course was coinstructed by DNALC staff and CSHHS biology teacher Martin Glynn, with students coming on alternate days to the DNALC for their final two class periods. The course emphasized critical thinking and included experiments and independent projects across a range of biological systems: A plant unit analyzed transgenes in genetically modified food and newly sequenced genes in rice; human-based experiments used molecular tools to examine human origins and genetic variation; and work with *C. elegans* introduced the cutting-edge RNAi technique.

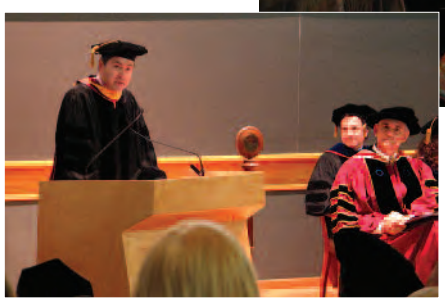
The fourth class of *Genome Science* commenced in the fall with the added benefit of students coming to the DNALC 5 days a week. The basic units on plants, RNAi, and human variation are being supplemented with new research projects. As advance work on our *Chloroplast Gene Sequencing* Project, the students tested primers and produced a DNA bar code to identify local plants. In collaboration with Tim Herman at the Center for BioMolecular Modeling at the Milwaukee School of Engineering, and Joan Kiely at the Biotechnology Teaching Center at Stony Brook University, we have added a new module on protein modeling. As part of the bioinformatics unit, the students re-

searched proteins involved in cell signaling and used three-dimensional software to highlight important parts of their structures. Coordinates from their modified structures were then used to construct physical models of the proteins. The students presented their models and created posters describing their proteins to scientists at a CSHL meeting on "Rat Genomics and Models." We are also pioneering a new section on metagenomics, which uses high-throughput sequencing to survey genes and organisms present in an ecosystem. In this case, students will use bioinformatics tools to search sequences from microbes in rotting wood, with the aim of identifying novel enzymes that break down plant cellulose into sugars that can be used for biofuel production. This collaboration involves former DNALC instructor Scott Bronson and researchers Niels Van der Lelie and Safiyh Taghavi at Brookhaven National Laboratory.

Watson School of Biological Sciences

Each January, students from the Watson School of Biological Sciences take a required teaching rotation, during which they work at the DNALC to learn effective skills for communicating with nonscientists. In the first phase of training, Watson School students observe DNALC instructors as they teach middle and high school labs. Students then work in pairs to develop lesson plans that will guide their own instruction. In the second phase of training, each graduate pair coteaches their prepared lab alongside a DNALC instructor. Detailed feedback on their teaching—including pace, knowledge, and engagement—prepares each pair for the final training phase: independently teaching the practiced lab (with DNALC staff available for support). After completing middle school and high school rotations, students select three additional lessons to demonstrate their new teaching skills or travel with DNA staff to provide off-site instruction at a local middle school.

At the annual Watson School commencement on April 26, DNALC Executive Director David Micklos was among four people whose contributions to science education were recognized with an honorary Doctor of Science. Accepting the degree, he highlighted the unique opportunity that the DNALC presented to him, to CSHL, and to Long Island:



Laurie Landeau, CSHL Trustee and DNALC Committee Chairperson, introduces Dave Micklos (standing at right and below) prior to his receipt of the degree.

> "Jim Watson is fond of saying that one should never be the brightest person in the room. I was acutely aware that this applied to me when I first came to Cold Spring Harbor 26 years ago. Whatever success I have had here was in large part motivated by my desire to fit in amongst the fabulous minds at Cold Spring Harbor, and the honor of this degree makes me feel that I have found a small niche in this great institution. I am very proud of what we have been able to accomplish at the Dolan DNA Learning Center. When I first came to Long Island, most students remembered Cold Spring Harbor for its Fish Hatchery. Now we have a generation of students who remember Cold Spring Harbor for its DNA—and fifth and sixth graders are getting the grounding in

the genetics they will need to flourish in the genome age. I want to make it clear that I really don't believe that the unlikely success of the DNA Learning Center could have been repeated at another institution. The DNA Learning Center arose from unique brew of high-level scientists and engaged philanthropists, reaching out to include young students in the seamless flow of the Laboratory's history and march into the future."

DNA Sequencing Service

The DNALC provided another year of free DNA sequencing to students and teachers worldwide. The *DNA Sequencing Service* allows users to analyze and compare their own mitochondrial (mt) DNA sequence with populations from around the world to explore human diversity. The mitochondrion is the cellular organelle responsible for providing energy in higher cells. A remnant of its ancient life as a free-living bacterium, the mitochondrion has its own chromosome (genome). Depending on energy demands, there are hundreds to thousands of mitochondria per cell, and each carries several copies of mitochondrial chromosome. Thus, mitochondrial DNA is highly amplified compared to nuclear DNA, which has only two copies. This makes mitochondrial DNA the ideal target for sequencing from tissue samples that are very old, very small, or badly degraded by the environment. The hypervariable region of the mitochondrial chromosome accumulates mutations quickly, providing a means to study genetic changes that have occurred during human evolution.

The DNALC popularized methods to use mitochondrial mutation analysis in education, focusing on the same DNA region used by *National Geographic*'s Genographic Project and featured in the popular book *The Seven Daughters of Eve*. Using DNALC protocols or ready-to-use kits, students isolate a 440-nucleotide sequence of their mitochondrial genome and send the amplified samples to the DNALC by overnight mail. Sequencing reactions are prepared by DNALC interns and sent to the CSHL Sequencing Shared Resource Facility in Woodbury for sequencing on an Applied Biosystems 3730xi Genetic Analyzer. The finished sequences are uploaded to an online DNA database at the DNALC's *BioServers* Internet site (www.bioservers.org), which provides tools to compare mitochondrial DNA sequences of individuals across the globe. Additionally, mitochondrial DNA sequences from Neanderthals (~50,000 years old) and Otzi "the ice man" (5000 years old) allow students to consider the question "how ancient is ancient?" In 2009, we sequenced 7057 student DNA samples submitted from 121 high schools, 39 community colleges, and 39 universities. The free sequencing service, which is now in its 11th year, is made possible by sequencing reagents donated by Applied Biosystems of Foster City, California.

Staff and Interns

In the fall, we said goodbye for a second time to Malissa Greif (formerly Hewitt). Malissa helped found and then managed our successful GMWL program for middle schools in the mid 1990s, leaving in 1998 to become a full-time mom. She returned in 2006 as a middle school instructor, recruiting a number of new schools into the GMWL program and developing new labs on bioremediation. We wish her the best of luck in her new home in Nissequogue.

As development of the *Genes to Cognition Online* website wound down, multimedia designer Stephen Blue left to concentrate on his teaching at City University of New York and Parsons School of Design. In addition to his work on *G2C Online*, Stephen, who joined us in 2007, designed the multimedia *Lab Centers* (www.dnalc.org/labcenter/) that accompany six of our most popular lab field trips. During the year, he continued to collaborate with CSHL Press, developing illustrations for our forthcoming textbook, *Genome Science*.

In December, high school instructor Jason Williams was promoted to the newly created position of partnership coordinator for the *iPlant Collaborative*. Jason will have a key role in developing large-

scale, distributed experiments that allow faculty and students to participate directly in modern plant research. He will work with the plant research community to identify available tools and data sets and then foster ongoing collaborations among scientists, teachers, and students. One project will provide online tools and databases to allow students to sequence and analyze genes used to study plant phylogenetics and diversity.

After graduating *Magna Cum Laude* from Long Island University with a bachelor's degree in forensic science and a minor in chemistry, Jennifer Aiello joined the DNALC staff as a middle school instructor. Jen started here in 2002 as a high school intern from Kings Park High School, continuing to work at the DNALC through her years at C.W. Post, when she managed our free *DNA Sequencing Service* and our *C. elegans* strain bank. Jen has already brought new experiences in forensic science to our *Saturday DNA!* Program, which we anticipate will grow into a new summer camp offering.

New DNALC instructor, Jennifer Aiello.

The internship program continues to draw some of Long Island's most talented high school and college students, engaging them in science research and providing practical laboratory experience. We were pleased to accept a large group of new high school interns this year: Laura Bergsten (Cold Spring Harbor), George Economou (Syosset), Lindsay Hochberg (Oyster Bay), Anouva Kalra-Iall (Roslyn), Anastasia Minkin (Oyster Bay), Nate Rahimzada (North Shore Hebrew Academy), Jaylin Sasson (Jericho), Max Vaysman (Commack), Pamela Wax (Harborfields), and Sara Wienclaw (Kellenberg). We also welcomed Annie Laurie Benzie (Adelphi) as a college intern to help with *DNA Sequencing Service* and *C. elegans* strain requests. Returning interns were Emily Troge (Our Lady of Mercy) and Kevin Wu (Jericho). Many of our interns continued to invest their DNALC experience in their own research. Arielle Scardino (City College) worked with Jermel Watkins to explore how a decreased expression of certain mitochondrial genes can be used as a biomarker for neuromuscular dysfunction.

The *BioMedia* Group continues to rely on Chris Weidler (Farmingdale State College) and his range of computer skills. Chris created all of the themes for our new blogs and has stepped in to help with video processing. Tony Biondo (Stony Brook University) provided vital programming support on our *iPlant DNA Subway*, as well as video encoding for hundreds of online clips.

We bid farewell to a number of interns when they began their college careers: Charmaine Brown (St. John's University), Nancy Desai (Boston University), Rachel Gellerman (Binghamton University), Yasmina Macer (Wellesley College), Stephanie Parascandalo (Queens College), Arielle Scardino (City College of New York), and Kaitlin Watrud (Gettysburg College). A number returned to assist with summer camps: Nick Wilkens (Ithaca College), Seth Schortz (Emory University), Lauren Thompson (Barnard College), Matthew Woo (Vassar College), and Janice Yong (Boston University).

2009 Workshops, Meetings, and Collaborations

January 8	*iPlant Collaborative* Cyberinfrastructure Workshop, Biosphere 2, University of Arizona, Tucson, Arizona
January 8	National Genographic Presentation, Nassau BOCES, Garden City, New York
January 10	HHMI Professional Development Workshop, "PCR and Human DNA Variations, Part 2," *Harlem DNA Lab*
January 12	Site visit by *G2C Online* Fellow Caren Gough, Education Consultant
January 23	NIH *Inside Cancer* Workshop, Illinois Institute of Technology, Chicago, Illinois
January 24	*Saturday DNA!* "Murder at the Museum," DNALC
January 27	Meeting with Scott Bronson, Brookhaven National Laboratory, Upton, New York
February 3	Site visit by Robin Hood Foundation, *Harlem DNA Lab*
February 6	Site visit by Marc Nivet, Josiah Macy, Jr. Foundation, New York
February 9	Site visit by Wanda Wakal, Executive Officer, Research & Development in Gifted & Enrichment, Learning Support Organization, *Harlem DNA Lab*
February 9	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
February 14	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
February 17–18	*G2C Online* Workshop, Contra Costa County School District, Pleasant Hill, California
February 19	NIH *Inside Cancer* Workshop, Contra Costa County School District, Pleasant Hill, California
February 19	Site visit by *G2C Online* Fellows Caren Gough, Education Consultant, and Laura Maitland, Advanced Placement Psychology Consultant
February 21	HHMI Professional Development Workshop, "Variability and Inheritance," *Harlem DNA Lab*
February 24	Site visit by Zoraya Victory, World Science Festival Planning Committee, *Harlem DNA Lab*
February 26	Science Supervisors' Meeting with Alan Ascher, *Harlem DNA Lab*
February 27	HHMI Professional Development Workshop, "Variability and Inheritance," *Harlem DNA Lab*
February 28	*Saturday DNA!* "Dust Away Crime," DNALC
March 5	Site visit by Dale Cole with OSI Pharmaceuticals Inc. members and students from Wyandanch schools
March 6–7	HHMI Peer Cluster Meeting, University of Wisconsin, Milwaukee, Wisconsin
March 6–7	*G2C Online* Workshop, *Harlem DNA Lab*
March 9–10	*G2C Online* Workshop, Fralin Biotechnology Center, Blacksburg, Virginia
March 10	Site visit by Abby Kirschner, Curriculum and Content Coordinator, NYC Teaching Fellows Program, *Harlem DNA Lab*
March 12	HHMI Professional Development Workshop, "Transformation and Protein Isolation," *Harlem DNA Lab*
March 12	NIH *Inside Cancer* Workshop, Virginia Tech, Blacksburg, Virginia
March 13	Site visit by Orla Dolan, Cork Cancer Research Center, Cork, Ireland
March 13	Site visit by Ryan Goble, Curriculum Coordinator, Literacy and New Teacher Coach, Banana Kelly High School, *Harlem DNA Lab*
March 13–14	NSF *Silencing Genomes* Follow-up Workshop, Virginia Tech, Blacksburg, Virginia
March 19–21	National Science Teachers Association National Conference Presentations: "Bioinformatics in Your Classroom," "Sense in Molecules: A Polymorphic Analysis," and "*G2C Online*," New Orleans, Louisiana
March 20	Site visit by David Porteous, University of Edinburgh Centre for Molecular Medicine and Institute of Genetics and Molecular Medicine, Edinburgh, Scotland
March 20	Women in Science Conference, Suffolk Community College, Brentwood, New York
March 21	HHMI Professional Development Workshop, "Transformation and Protein Isolation," *Harlem DNA Lab*
March 28	*Saturday DNA!* "Mitochondrial DNA," DNALC
March 28	Site visit by College of New Rochelle alumni, New Rochelle, New York
March 28	NIH *Inside Cancer* Workshop, *Harlem DNA Lab*
April 4	HHMI Professional Development Workshop, "DNA Analysis and Forensics," *Harlem DNA Lab*
April 17	Interview with Sue Wessler, University of Georgia, Athens, Georgia, DNALC
April 17	NIH *Inside Cancer* Workshop, University of Colorado Anschutz Medical Campus, Denver, Colorado
April 18	*G2C Online* Workshop, University of Colorado Anschutz Medical Campus, Denver, Colorado
April 20–23	Site visit to Carolina Biological Supply Company, Burlington, North Carolina
April 22–24	Seminar, workshop, and dedication of *MobileLab*, Ho Yu College and Primary School, Hong Kong
April 25	NIH *Inside Cancer* Workshop, Arizona State University, Tempe, Arizona
April 25	Science Council of New York City Workshop, Stuyvesant High School, New York
May 1	HHMI Professional Development Workshop, "DNA Analysis and Forensics," *Harlem DNA Lab*
May 1–2	*G2C Online* Workshop, Arizona Biodesign Institute, Arizona State University, Tempe, Arizona
May 5	Site visit by Jan Kang, Trinity School, *Harlem DNA Lab*
May 7	*Great Moments in DNA Science* Honors Seminar: "Of Mice and Men: Using a Mouse Model to Identify New Targets for Cancer Therapy," Eric Sawey, CSHL
May 8	Interview with Svante Pääbo, Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany, DNALC

May 9	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part One," *Harlem DNA Lab*
May 14	*Great Moments in DNA Science* Honors Seminar: "Using High-throughput Sequencing to Study Cancer Genomes," Emily Hodges, CSHL
May 15	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part One," *Harlem DNA Lab*
May 16	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part Two," *Harlem DNA Lab*
May 16	*Saturday DNA!* "Who's the Suspect?" DNALC
May 18–20	NIH SEPA Principal Investigators Meeting, Science Museum of Minnesota, St. Paul, Minnesota
May 21	*Great Moments in DNA Science* Honors Seminar: "Illuminating Biology—The Science of Fluorescent-tagged Proteins in Corn," Stacy DiBlasio, CSHL
May 21–22	NSF *Silencing Genomes* Follow-up Workshop, Austin Community College, Austin, Texas
May 22	NIH *Inside Cancer* Workshop, Minneapolis Community & Technical College, Minneapolis, Minnesota
May 22	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part Two," *Harlem DNA Lab*
May 26	North Carolina Life Science and Bioinformatics Education Symposium, North Carolina Biotech Center, Raleigh, North Carolina
May 28	Interviews with Russell Doolittle, Harvard University, Cambridge, Massachusetts; Craig Venter, J. Craig Venter Institute, San Diego, California; and Tim White, University of California, Berkeley, DNALC
May 29	Interviews with Seth Grant, Wellcome Trust Sanger Institute, Cambridge, England; Nicole King, University of California, Berkeley; and Sue Wessler, University of Georgia, Athens, DNALC
May 30–31	NSF *Silencing Genomes* and *G2C Online* Seminars, Bossier Parish Community College, Bossier Parish, Louisiana
May 31	NIH *Inside Cancer* Workshop, Bossier Parish Community College, Bossier Parish, Louisiana
June 1	Interviews with John Doebley, University of Wisconsin, Madison, and Eugenie Scott, National Center for Science Education, Oakland, California, DNALC
June 1–5	NSF *Silencing Genomes* Workshop, California State University, Dominguez Hills, California
June 6	NIH *Inside Cancer* Workshop, St. Louis Science Center, St. Louis, Missouri
June 8–12	NSF *Silencing Genomes* Workshop, St. Louis Science Center, St. Louis, Missouri
June 9	16th Annual Golf Outing, Piping Rock Club, Locust Valley, New York
June 9	Site visit by Kristin Baldwin and Amy Chase, *E. coli* Art Project for World Science Festival, *Harlem DNA Lab*
June 10	NIH *Inside Cancer* Workshop, Tulsa Community College, Tulsa, Oklahoma
June 10	Site visit by Kidgie Williams, Hospitality Committee for United Nations Delegations, Inc., and United Nations delegates' family members, New York
June 11	Site visit by Maxmillian Angerholzer III, Executive Director and Secretary, Lounsbery Foundation, *Harlem DNA Lab*
June 11	World Science Festival, New York University, New York
June 11–12	*G2C Online* Workshop, Tulsa Community College, Tulsa, Oklahoma
June 12	Site visit by Kristin Baldwin and Amy Chase, *E. coli* Art Project for World Science Festival, *Harlem DNA Lab*
June 13	*Saturday DNA!* "Oil Eating Bacteria," DNALC
June 15–19	*DNA Science* Workshop, *Harlem DNA Lab*
June 17–19	*Genomics in Education* Symposium, St. Louis, Missouri
June 20	NIH *Inside Cancer* Workshop, North Carolina Agricultural & Technical University, Greensboro
June 22–26	*Fun with DNA* Workshop, *Harlem DNA Lab*
June 22–26	NSF *Silencing Genomes* Workshop, North Carolina Agricultural & Technical University, Greensboro
June 29	HHMI Professional Development Workshop, "DNA Transformation and Protein Isolation," *Harlem DNA Lab*
June 29–July 2	*Fun with DNA* Workshop, DNALC *Fun with DNA* Workshop, DNALC *West* *Plant Genomics* Workshop, DNALC *World of Enzymes* Workshop, DNALC
June 30	HHMI Professional Development Workshop, "DNA Analysis and Forensics," *Harlem DNA Lab*
July 1	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part One," *Harlem DNA Lab*
July 2	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part Two," *Harlem DNA Lab*
July 6	HHMI Professional Development Workshop, "DNA Transformation and Protein Isolation," *Harlem DNA Lab*
July 6–10	*DNA Science* Workshop, DNALC *Fun with DNA* Workshop, DNALC *Green Genes* Workshop, DNALC *World of Enzymes* Workshop, DNALC *West*
July 7	HHMI Professional Development Workshop, "DNA Analysis and Forensics," *Harlem DNA Lab*
July 8	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part One," *Harlem DNA Lab*
July 9	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part Two," *Harlem DNA Lab*
July 9	Site visit by New York State Biology Professional Development Network with Caren Gough, Education Consultant
July 10	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
July 13	Site visit by Tuan Chiong Chew, Executive Director, Singapore Science Center, Singapore

July 13–17	*DNA Science* Workshop, DNALC *West*
	Genetic Horizons Workshop, DNALC
	World of Enzymes Workshop, DNALC
July 13–24	Site visit by *Inside Cancer* Faculty Fellows Wendy Wooten, Robin Cochran-Dirksen, and Greg Ballog
July 13–24	HHMI New York Leadership Symposium, DNALC
July 15	Site visit by Rod Miller, Mark Greenburg, Donna Murasko, and Patricia Austin, Drexel University, Philadelphia, Pennsylvania
July 15–17	American Association for the Advancement of Science Meeting, "Transforming Undergraduate Biology Education," Washington, D.C.
July 16	Site visit by NYS Assembly member Deborah J. Glick, Greenwich Village, New York
July 17	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
July 20–24	*Fun with DNA* Workshop, DNALC
	Green Genes Workshop, DNALC *West*
	Human Genomics Workshop, DNALC
July 20–31	Site visit by *Inside Cancer* Fellows Lisa Orenstein and Maggy Witecki
July 21	Site visit by Lawrence Kobilinsky, Albert Harpe, and Linda Rourke, John Jay College of Criminal Justice, New York
July 22	Site visit by Rick Acritelli and 10 teachers, The New York Center for Teacher Development, Port Jefferson, New York
July 24	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
July 24	Site visit by 15 STEP program students, SUNY, Old Westbury, New York
July 27–31	*DNA Science* Workshop, *Harlem DNA Lab*
	Genetic Horizons Workshop, DNALC *West*
	Green Genes Workshop, DNALC
	World of Enzymes Workshop, DNALC
	Human Genomics Workshop, DNALC
July 31	NIH *Inside Cancer* Workshop, Howard University, Washington, D.C.
August 3	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
August 3–7	NSF *Silencing Genomes* Workshop, Howard University, Washington, D.C.
August 3–7	*DNA Science* Workshop, DNALC
	Fun with DNA Workshop, DNALC
	Fun with DNA Workshop, DNALC *West*
	Genetic Horizons Workshop, DNALC
August 4	HHMI Professional Development Workshop, "Variability and Inheritance," *Harlem DNA Lab*
August 5	HHMI Professional Development Workshop, "DNA Transformation and Protein Isolation," *Harlem DNA Lab*
August 6	HHMI Professional Development Workshop, "DNA Analysis and Forensics," *Harlem DNA Lab*
August 7	*G2C Online* Workshop, Madison Area Technical College, Madison, Wisconsin
August 8	NIH *Inside Cancer* Workshop, Madison Area Technical College, Madison, Wisconsin
August 10–14	*DNA Science* Workshop, DNALC
	Green Genes Workshop, DNALC
	Human Genomics Workshop, *Harlem DNA Lab*
	World of Enzymes Workshop, DNALC
	World of Enzymes Workshop, DNALC *West*
August 12–14	Professional Development Workshop, Hauppauge UFSD, New York
August 14	NIH *Inside Cance*r Workshop, Houston Community College Northwest, Houston, Texas
August 17	Site visit by Jill Hirsch, Kathy Tompkins, and Lacey Tompkins, The Chapin School, New York
August 17–20	HHMI Peer Cluster Meeting, Great Falls, Montana
August 17–21	*DNA Science* Workshop, DNALC
	DNA Science Workshop, DNALC West
	Fun with DNA Workshop, DNALC
	Fun with DNA Workshop, *Harlem DNA Lab*
	Genetic Horizons Workshop, DNALC
August 17–21	NSF *Silencing Genomes* Workshop, Houston Community College Northwest, Houston, Texas
August 24	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
August 24–28	*DNA Science* Workshop, DNALC
	DNA Science Workshop, Wyandanch Public Library, Wyandanch, New York
	Green Genes Workshop, DNALC
	Human Genomics Workshop, DNALC *West*
	World of Enzymes Workshop, DNALC
August 25	HHMI Professional Development Workshop, "Variability and Inheritance," *Harlem DNA Lab*
August 26	Site visit by HHMI Fellow Caren Gough, Executive Consultant, and Kathleen Rucker, Brooklyn International High School, Brooklyn, New York

August 26	HHMI Professional Development Workshop, "DNA Transformation and Protein Isolation," *Harlem DNA Lab*
August 27	HHMI Professional Development Workshop, "DNA Analysis and Forensics," *Harlem DNA Lab*
August 28	*G2C Online* Workshop, John Jay College of Criminal Justice, New York
August 29	NIH *Inside Cancer* Workshop, John Jay College of Criminal Justice, New York
Aug. 31–Sept. 4	*DNA Science* Workshop, DNALC *Fun with DNA* Workshop, DNALC *Green Genes* Workshop, DNALC *West* *World of Enzymes* Workshop, DNALC
September 1	Site visit by Hilleary Osheroff, Samara Rubinstein, and Monique Scott, American Museum of Natural History, New York
September 8	Site visit by Scott Bronson, Safiyh Taghavi, and Daniel van der Lelie, Brookhaven National Laboratory, Upton, New York
September 9	Site visit by Joan Kiely, Stony Brook University, Stony Brook, New York
September 11–18	JGI Metagenomics Course, Walnut Creek, California
September 16	Site visit by 10 scientists, Tsinghua University, Beijing, China
September 21	Interview with Jean-Philippe Vielle Calzada, Laboratorio Nacional de Genomica para LaBiodiversidad, Irapuato, Mexico, DNALC
September 21	Meeting with Bhuma Krishnamachari, C.W. Post Genetic Counseling Program, C.W. Post University, Brookville, New York
September 24	Interview with Janet Rossant, The Hospital for Sick Children, Toronto, Canada, DNALC
September 24	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
September 25	Site visit by Hilleary Osheroff, American Museum of Natural History, New York, New York, *Harlem DNA Lab*
September 26	HHMI Professional Development Workshop, "DNA Structure and Isolation," *Harlem DNA Lab*
October 3–9	*Weed to Wonder* Videography, Balsas River Valley region of Mexico, documenting the history of maize cultivation
October 5	Interview with Suketoshi Taba, International Maize and Wheat Improvement Center, Texcoco, Mexico
October 7	Interviews with Jean-Philippe Vielle Calzada and Luis R. Herrera Estrella, Laboratorio Nacional de Genomica para La Biodiversidad, Irapuato, Mexico
October 9	NIH *Inside Cancer* Workshop, Oxnard College, Oxnard, California
October 10	*G2C Online* Workshop, Oxnard College, Oxnard, California
October 16	Interview with Ed Buckler, Cornell University, Ithaca, New York, and Torbert Rocheford, Purdue University, West Lafayette, Indiana, DNALC
October 17	*Saturday DNA!* "Disease Detectives," DNALC
October 17	HHMI Professional Development Workshop, "Variability and Inheritance," *Harlem DNA Lab*
November 2	*Weed to Wonder* videography of George Shull Recreation, Uplands Farm, CSHL
November 2–4	Site visit by Maria Halaschek-Weiner and Jochen Stadler, Vienna Open Lab, Vienna, Austria
November 3	HHMI Professional Development, "Bacterial Transformation and Protein Isolation," *Harlem DNA Lab*
November 5	NIH *Inside Cance*r Workshop, Raritan Community College, Somerville, New Jersey
November 6	*G2C Online* Workshop, Raritan Community College, Somerville, New Jersey
November 7	HHMI Professional Development Workshop, "Bacterial Transformation and Protein Isolation," *Harlem DNA Lab*
November 9–10	HHMI Precollege Programs Meeting, Bethesda, Maryland
November 10–13	NSF Research Coordination Networks–Undergraduate Biology Education Grant Review, Arlington, Virginia
November 14	*Saturday DNA!* "Personalized Medicine," DNALC
November 14	HHMI Professional Development Workshop, "Bacterial Transformation and Protein Isolation," *Harlem DNA Lab*
November 20	Site visit by Richard Thompson, Melanie Harasym, and alumni, College of New Rochelle, New Rochelle, New York, with Barbara Candee, CSHL Association Board Director
November 20	*G2C Online* Workshop, Great Bay Community College, Portsmouth, New Hampshire
November 21	NIH *Inside Cancer* Workshop, Great Bay Community College, Portsmouth, New Hampshire
November 30	Meeting with middle and high school science faculty, Trinity School, *Harlem DNA Lab*
Nov. 30–Dec. 11	Singapore Primary Teachers Attachment, DNALC
December 2–4	NSF ATE Grant Review Panel, National Science Foundation, Arlington, Virginia
December 3	Site visit by Barbara Gill, Barbara Rich, and Janet Eilber, The Dana Foundation, New York
December 4	Meeting with Robert Krulwich, National Public Radio, New York
December 5	HHMI Professional Development Workshop, "DNA Analysis and Forensics," *Harlem DNA Lab*
December 12	*Saturday DNA!* "Life Up Close: Microscopic Worlds," DNALC
December 14	Site visit by Theresa Regnante, United Way of Long Island, and Teresa Kemp-Zielenski, DNALC Corporate Advisory Board member
December 19	HHMI Professional Development Workshop, "PCR and Human DNA Variation, Part One," *Harlem DNA Lab*
December 30	Site visit by Andrea and Sabrina Gallego, The Simons Foundation, New York

Sites of Major Faculty Workshops 1985–2009

Key: *Middle School* High School **College**

ALABAMA	University of Alabama, Tuscaloosa	1987–1990
ALASKA	University of Alaska, Fairbanks	1996
ARIZONA	Arizona State University, Tempe	2009
	Tuba City High School	1988
ARKANSAS	Henderson State University, Arkadelphia	1992
CALIFORNIA	**California State University, Dominguez Hills**	**2009**
	California State University, Fullerton	**2000**
	California Institute of Technology, Pasadena	**2007**
	Canada College, Redwood City	1997
	City College of San Francisco	2006
	Contra Costa County Office of Education, Pleasant Hill	2002, 2009
	Foothill College, Los Altos Hills	**1997**
	Harbor–UCLA Research & Education Institute, Torrance	2003
	Los Angeles Biomedical Research Institute (LA Biomed), Torrance	**2006**
	Laney College, Oakland	1999
	Lutheran University, Thousand Oaks	1999
	Oxnard Community College, Oxnard	2009
	Pierce College, Los Angeles	**1998**
	Salk Institute for Biological Studies, La Jolla	2001, 2008
	San Francisco State University	**1991**
	San Jose State University	**2005**
	University of California, Davis	1986
	University of California, Northridge	**1993**
COLORADO	Aspen Science Center	2006
	Colorado College, Colorado Springs	1994, 2007
	United States Air Force Academy, Colorado Springs	**1995**
	University of Colorado, Denver	1998, 2009
CONNECTICUT	Choate Rosemary Hall, Wallingford	1987
FLORIDA	Armwood Senior High School, Tampa	1991
	Florida Agricultural & Mechanical University, Tallahassee	2007–2008
	North Miami Beach Senior High School	1991
	University of Miami School of Medicine	2000
	University of Western Florida, Pensacola	1991
GEORGIA	Fernbank Science Center, Atlanta	1989, 2007
	Morehouse College, Atlanta	**1991, 1996–1997**
HAWAII	Kamehameha Secondary School, Honolulu	1990
ILLINOIS	Argonne National Laboratory	1986–1987
	Illinois Institute of Technology, Chicago	2009
	University of Chicago	**1992, 1997**
INDIANA	Butler University, Indianapolis	1987
IDAHO	University of Idaho, Moscow	1994
IOWA	Drake University, Des Moines	1987
KANSAS	University of Kansas, Lawrence	1995
KENTUCKY	Murray State University	1988
	University of Kentucky, Lexington	1992
	Western Kentucky University, Bowling Green	1992
LOUISIANA	Bossier Parish Community College	2009
	Jefferson Parish Public Schools, Harvey	1990
	John McDonogh High School, New Orleans	1993
MAINE	Bates College, Lewiston	1995
	Foundation for Blood Research, Scarborough	2002
MARYLAND	Annapolis Senior High School	1989
	Frederick Cancer Research Center, Frederick	1995
	McDonogh School, Baltimore	1988
	Montgomery County Public Schools	1990–1992
	National Center for Biotechnology Information, Bethesda	2002
	St. John's College, Annapolis	*1991*
	University of Maryland, School of Medicine, Baltimore	**1999**
MASSACHUSETTS	Beverly High School	1986
	Biogen, Cambridge	2002

	Boston University	**1994, 1996**
	CityLab, Boston University School of Medicine	1997
	Dover-Sherborn High School, Dover	1989
	Randolph High School	1988
	The Winsor School, Boston	1987
	Whitehead Institute for Biomedical Research, Cambridge	2002
MICHIGAN	Athens High School, Troy	1989
MINNESOTA	Minneapolis Community and Technical College	2009
	University of Minnesota, St. Paul	2005
MISSISSIPPI	Mississippi School for Math & Science, Columbus	1990–1991
	Rust College, Holly Springs	2006–2008
MISSOURI	**St. Louis Science Center, St. Louis**	**2008–2009**
	Stowers Institute for Medical Research, Kansas City	2002, 2008
	Washington University, St. Louis	**1989, 1997**
NEVADA	University of Nevada, Reno	1992
NEW HAMPSHIRE	Great Bay Community College, Portsmouth	2009
	New Hampshire Community Technical College, Portsmouth	**1999**
	St. Paul's School, Concord	1986–1987
NEW JERSEY	Coriell Institute for Medical Research, Camden	2003
	Raritan Valley Community College, Somerville	2009
NEW MEXICO	Biolink Southwest Regional Meeting, Albuquerque	2008
NEW YORK	Albany High School	1987
	American Museum of Natural History, New York	2007
	Bronx High School of Science	1987
	Canisius College, Buffalo	2007
	Cold Spring Harbor High School	1985, 1987
	Columbia University, New York	**1993**
	Cornell University, Ithaca	**2005**
	DeWitt Middle School, Ithaca	*1991, 1993*
	DNA Learning Center	1988–1995, 2001–2004, 2006–2009
	DNA Learning Center	**1990, 1992, 1995, 2000**
	DNA Learning Center	*1990–1992*
	DNA Learning Center West	2005
	Fostertown School, Newburgh	*1991*
	Harlem DNA Lab, East Harlem	2008–2009
	Huntington High School	1986
	Irvington High School	1986
	John Jay College of Criminal Justice	2009
	Junior High School 263, Brooklyn	*1991*
	Lindenhurst Junior High School	*1991*
	Mt. Sinai School of Medicine, New York	1997
	New York City Department of Education	2007
	New York Institute of Technology, New York	2006
	New York Institute of Technology, New York	**2006**
	Orchard Park Junior High School	*1991*
	Plainview-Old Bethpage Middle School	*1991*
	State University of New York, Purchase	1989
	State University of New York, Stony Brook	1987–1990
	Stuyvesant High School, New York	1998–1999
	The Rockefeller University, New York	2003
	Titusville Middle School, Poughkeepsie	*1991, 1993*
	Trudeau Institute, Lake Saranac	2001
	Union College, Schenectady	2004
	United States Military Academy, West Point	**1996**
	Wheatley School, Old Westbury	1985
NORTH CAROLINA	CIIT Center for Health Research, Triangle Park	2003
	North Carolina Agricultural & Technical State University, Greensboro	**2006–2007, 2009**
	North Carolina School of Science, Durham	1987
OHIO	Case Western Reserve University, Cleveland	1990
	Cleveland Clinic	1987
	Langston University, Langston	2008
	North Westerville High School	1990

OKLAHOMA	Tulsa Community College, Tulsa	2009
	Oklahoma City Community College	**2000**
	Oklahoma City Community College	2006–2007
	Oklahoma Medical Research Foundation, Oklahoma City	2001
	Oklahoma School of Science and Math, Oklahoma City	1994
OREGON	Kaiser Permanente-Center for Health Research, Portland	2003
PENNSYLVANIA	Duquesne University, Pittsburgh	1988
	Germantown Academy	1988
	Kimmel Cancer Center, Philadelphia	2008
SOUTH CAROLINA	**Clemson University, Clemson**	**2004**
	Medical University of South Carolina, Charleston	1988
	University of South Carolina, Columbia	**1988**
TENNESSEE	NABT Professional Development Conference, Memphis	2008
TEXAS	Austin Community College-Rio Grande Campus	2000
	Austin Community College–Eastview Campus	**2007–2009**
	Houston Community College Northwest, Houston	**2009**
	J.J. Pearce High School, Richardson	1990
	Langham Creek High School, Houston	1991
	Midland College, Midland	2008
	Southwest Foundation for Biomedical Research, San Antonio	2002
	Taft High School, San Antonio	1991
	Texas A&M, AG Research and Extension Center, Weslaco	2007
	Trinity University, San Antonio	**1994**
	University of Texas, Austin	**1999, 2004**
UTAH	University of Utah, Salt Lake City	1993
	University of Utah, Salt Lake City	**1998, 2000**
	Utah Valley State College, Orem	**2007**
VERMONT	University of Vermont, Burlington	1989
VIRGINIA	Eastern Mennonite University, Harrisonburg	1996
	Jefferson School of Science, Alexandria	1987
	Mathematics and Science Center, Richmond	1990
	Mills Godwin Specialty Center, Richmond	1998
	Virginia Polytechnic Institute and State University, Blacksburg	**2005, 2008–2009**
WASHINGTON	Fred Hutchinson Cancer Research Center, Seattle	1999, 2001, 2008
	University of Washington, Seattle	**1993, 1998**
WASHINGTON, D.C	**Howard University**	**1992, 1996, 2009**
WEST VIRGINIA	Bethany College	1989
WISCONSIN	Blood Center of Southeastern Wisconsin, Milwaukee	2003
	M**adison Area Technical College**	**1999, 2009**
	Marquette University, Milwaukee	1986, 1987
	University of Wisconsin, Madison	1988, 1989
	University of Wisconsin, Madison	**2004**
WYOMING	University of Wyoming, Laramie	1991
AUSTRALIA	Walter and Eliza Hall Institute and University of Melbourne	1996
AUSTRIA	**Vienna Open Lab**	**2007**
CANADA	Red River Community College, Winnipeg, Manitoba	1989
CHINA	**Ho Yu College, Hong Kong**	**2009**
GERMANY	Urania Science Center, Berlin	2008
ITALY	Porto Conte Research and Training Laboratories, Alghero	1993
	International Institute of Genetics and Biophysics, Naples	1996
MEXICO	ASPB Plant Biology, Merida	2008
PANAMA	**University of Panama, Panama City**	**1994**
PUERTO RICO	University of Puerto Rico, Mayaguez	1992
	University of Puerto Rico, Mayaguez	**1992**
	University of Puerto Rico, Rio Piedras	**1993**
	University of Puerto Rico, Rio Piedras	1994
RUSSIA	Shemyakin Institute of Bioorganic Chemistry, Moscow	1991
SINGAPORE	National Institute of Education	2001–2005
SWEDEN	Kristineberg Marine Research Station, Fiskebackskil	
	Uppsala University, Uppsala	2000
THE NETHERLANDS	**International Chromosome Conference, Amsterdam**	**2007**

2009 Grants

Grantor	*Program*	*Duration*	*2009 Funding+*
FEDERAL GRANTS			
National Institutes of Health	Science Education Partnership Award (SEPA): Nationwide Dissemination of Inside Cancer Internet Site	8/07-7/10	$97,358
National Science Foundation	Course, Curriculum, and Laboratory Instruction (CCLI) Program: Nationwide Dissemination of RNAi Curriculum	9/07-8/10	165,361
National Science Foundation, American Association for the Advancement of Science	National Science Digital Library: Meta-tagging DNALC Internet Content for BiosciEdNet	10/05-9/09	65,240
National Science Foundation, University of Arizona	Educational Outreach for iPlant: A Cyberinfrastructure for Plant Sciences	2/08-1/13	409,411
National Science Foundation, Cornell University	Weed to Wonder Internet Site Development: Educational Outreach for Functional Genomics of the Maize Shoot Apical Meristem	9/08-8/10	190,156
NONFEDERAL GRANTS			
Dana Foundation	*Genes to Cognition (G2C) Online* Internet Site Development	10/04-3/09	$14,725
Dialog Gentechnik	DNALC Licensing	2009	62,400
Hewlett Foundation	*Genes to Cognition (G2C) Online* Internet Site Dissemination and Evaluation	10/05-4/10	107,387
HHMI Foundation	Pre-College Science Education Initiative: NYC Teacher Professional Development	9/07-8/12	136,126
Dana Foundation	*Harlem DNA Lab* Operating Support	3/09-2/12	118,298
North Shore-LIJ Health System	DNALC *West* Operating Support	2009	50,000
Lounsbery Foundation	Biotechnology Footlocker Program: *Harlem DNA Lab*	11/09-8/10	51,916
Porter Foundation	Scholarships for Minority and Underserved Students at *Harlem DNA Lab*	3/08-3/10	31,850
Bank of America	Scholarships for Minority and Underserved Students on Long Island	2009	25,000
National Grid Foundation	Scholarships for Minority and Underserved Students in the Brentwood Union Free School District	5/09-5/10	10,000

The following schools each contributed $1,000 or more for participation in the Curriculum Study Program:

Bethpage Union Free School District	1,500	Manhasset Union Free School District	2,500
East Meadow Union Free School District	3,000	Massapequa Union Free School District	3,000
Elwood Union Free School District	3,000	Northport-East Northport	2,500
Garden City Union Free School District	1,500	North Shore Central School District	3,000
Great Neck Union Free School District	3,000	North Shore Hebrew Academy	3,000
Green Vale School	3,000	Oceanside Union Free School District	3,000
Half Hollow Hills Central School District	1,500	Oyster Bay-East Norwich School District	1,500
Harborfields Central School District	1,500	Plainedge Union Free School District	3,000
Herricks Union Free School District	1,500	Plainview-Old Bethpage Central School District	3,000
Huntington Union Free School District	3,000	Port Washington Union Free School District	1,500
Island Trees Union Free School District	1,500	Ramaz School	1,500
Jericho Union Free School District	1,500	Roslyn Union Free School District	3,000
Kings Park Central School District	1,500	Sachem Central School District	3,000
Lawrence Union Free School District	3,000	South Huntington Union Free School District	1,500
Levittown UFSD	3,000	Syosset Central School District	1,500
Locust Valley Central School District	1,500	West Hempstead Union Free School District	3,000
Long Beach City School District	3,000	Yeshiva University High School for Girls	1,500

The following schools each contributed $1,000 or more for participation in Genetics as a Model for Whole Learning Program:

Amityville Union Free School District	$1,200	Lindenhurst Union Free School District	$1,400
Bay Shore Union Free School District	$6,000	Locust Valley Central School District	$7,750
Bellmore Union Free School District	$4,000	Merrick Union Free School District	$2,250
Bellmore-Merrick Central HS District	$16,000	MS 447 The Math and Science Exploratory School, NYC	$2,480
Bethpage Union Free School District	$2,250	Mott Hall V, NYC	$1,200
Commack Union Free School District	$5600	North Bellmore Union Free School District	$4,300
Deer Park Union Free School District	$1,600	North Shore Hebrew Academy	$1,000
Eastern Middle School, Greenwich, CT	$2,900	North Shore Central School District	$1,500
East Meadow Union Free School District	$2,550	Oceanside Union Free School District	$1,500
East Williston Union Free School District	$5,600	Old Westbury School of the Holy Child	$3,250
Elmont Union Free School District	$1,800	Oyster Bay – East Norwich Central School District	$2,475
Floral Park – Bellerose Union Free School District	$6,500	Rockville Centre Union Free School District	$2,400
Friends Academy, Locust Valley	$2,350	Roslyn Union Free School District	$3,600
Garden City Union Free School District	$10,950	St. Dominic Elementary School, Oyster Bay	$4,050
MS 181, NYC	$1,000	St. Edward the Confessor School, Syosset	$2,025
Great Neck Union Free School District	$11,800	Syosset Central School District	$32,500
Half Hollow Hills Central School District	$7,625	Three Village Central School District	$2,200
Hauppauge Union Free School District	$3,000	Trinity Regional School	$1,100
Herricks Union Free School District	$2,700	Valley Stream 13 Union Free School District	$1,200
Huntington Union Free School District	$4,350	Yeshiva Darchei Torah	$1,400
Jericho Union Free School District	$8,125	Yeshiva of North Jersey, NJ	$2,100
Lawrence Union Free School District	$6,700		

Dolan DNA Learning Center

Cold Spring Harbor Laboratory
One Bungtown Road
Cold Spring Harbor, New York 11724

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