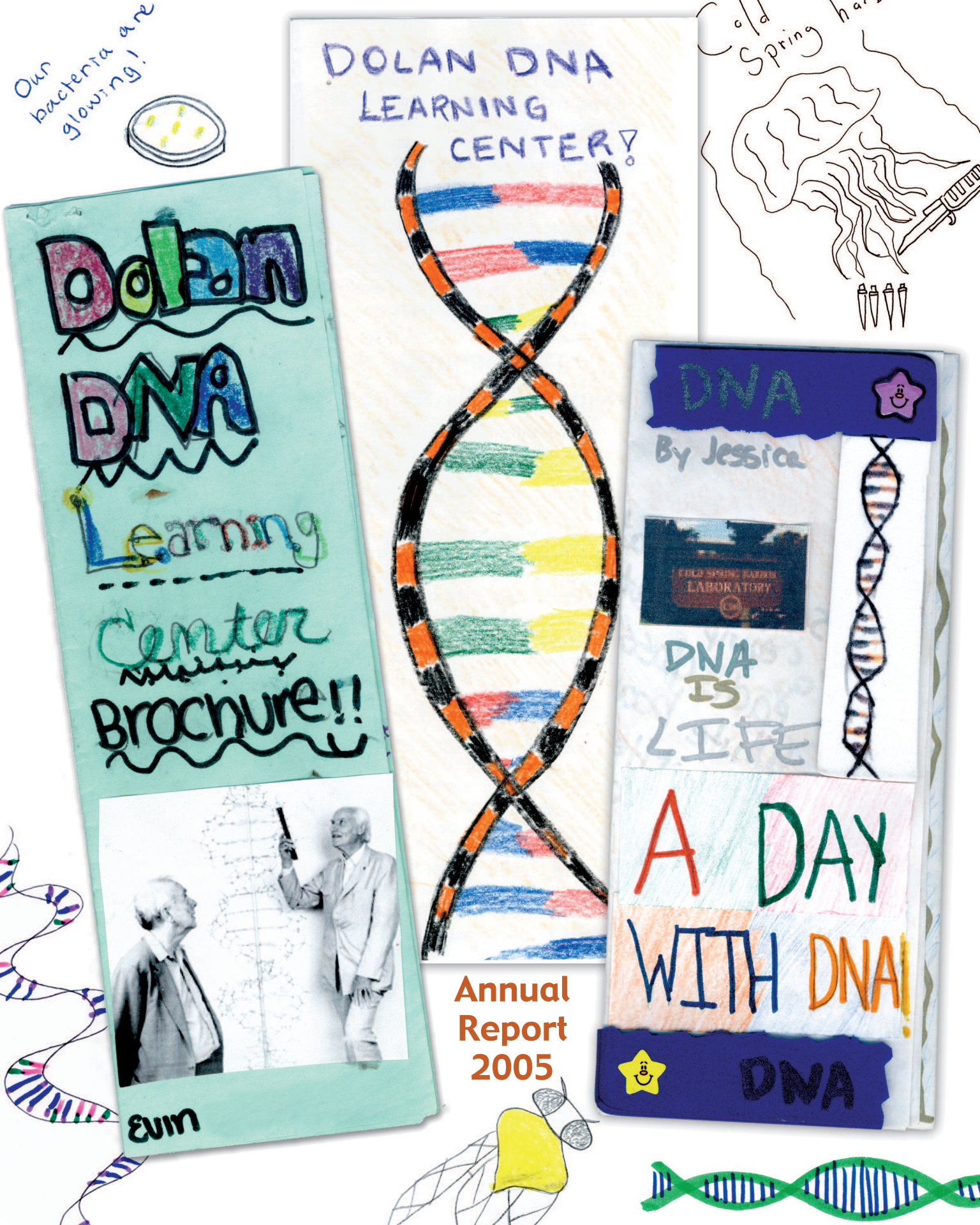

Our bacteria are glowing!
DOLAN DNA LEARNING CENTER!
Dolan DNA Learning Center Brochure!!
DNA By Jessica
DNA IS LIFE
A DAY WITH DNA!
DNA
Annual Report 2005

DOLAN DNA LEARNING CENTER
EXECUTIVE DIRECTOR'S REPORT

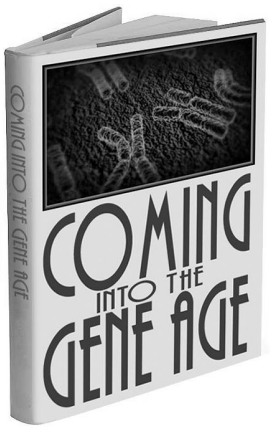
Preparing students and families to thrive in the gene age

ADMINISTRATION	INSTRUCTION	BIOMEDIA	TECHNOLOGY DEVELOPMENT
Nancy Daidola	**Elna Carrasco**	**John Connolly**	**Adrian Arva**
Mary Lamont	**Jeanette Collette**	**Eun-Sook Jeong**	**Greg Chin**
Stacy Leotta	**David Gundaker**	**Susan Lauter**	**Uwe Hilgert**
David Micklos	**Natalia Hanson**	**Chun-hua Yang**	**Bruce Nash**
Karen Orzel	**Laura Johns**		
Carolyn Reid	**Amanda McBrien**		
	Erin McKechnie		
	Danielle Sixsmith		
	Lauren Weidler		

People in the region of the upper Yukon refer to their part of Alaska as "the country." A stranger appearing among them is said to have "come into the country."

In his book *Coming into the Country*, John McPhee describes his experiences in Alaska, in 1976, as people anticipated the opening of oilfields and pipelines in that last great American frontier. McPhee's Alaska of 1976 presents an appropriate metaphor for biology in 2006. Like Alaska, the landscapes of genomes laid bare present vistas of limitless promise. Mining living genomes presents many of the same logistical and philosophical problems as mining the Alaskan wilderness. Frontiers of all kinds challenge similar sorts of people—those anxious for knowledge, fortune, adventure, solitude, or another chance. The desires of those who would exploit the frontier need to be balanced against those who see it as a holy place for contemplation.

Coming into the gene age also challenges those who teach. DNA sequences from hundreds of organisms are available to anyone with an Internet connection—as are bioinformatics tools that allow one to explore sequence data, predict the presence of genes, and compare features shared between different organisms. These freely available resources hold the promise of making modern biology an egalitarian pursuit. For the first time in the history of biology, students can work with the same information, at the same time, and with the same tools as research scientists.



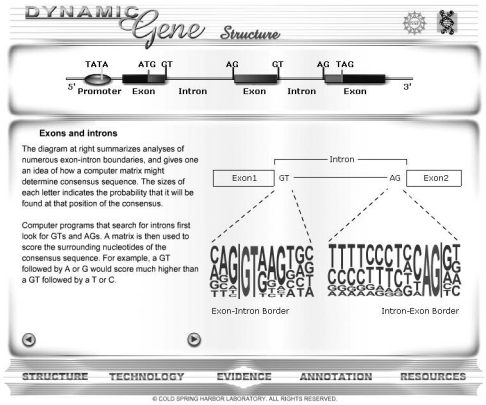
A fictitious cover design based upon John McPhee's *Coming into the Country*.

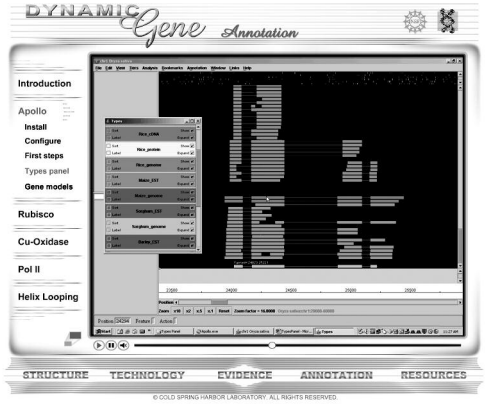
Working directly with genome data can help students understand the ever-changing concept of a gene and to conceptualize the "big picture" of a complex, dynamic genome. Evaluating genome evolution and understanding our shared genetic heritage also may be the best inoculation against racism.

Biology researchers and educators need to seize this unique opportunity to involve students in the ever-increasing trove of DNA data that will change forever how we think about life. First, we need to allow students to look at their own DNA and use it as an entrée to the genome world. Second, we need to integrate bioinformatics with biochemistry labs, so that students become adept in moving between the *in vitro* and *in silico* worlds. Third, we need to develop more intuitive, visually pleasing computer tools that engage students and allow them to quickly learn the rudiments of gene analysis. Fourth, we need to welcome students as partners in the effort to evaluate and annotate the vast number of genes that are known only as predicted computer models.

Coming into the Gene Age

During the past year, the Dolan DNALC made significant strides to help students and teachers come into the gene age. Working directly with CSHL researchers Lincoln Stein and Doreen Ware, we completed major elements of the *Dynamic Gene* Internet site. As educational outreach for the National Science Foundation (NSF)-funded Gramene Comparative Genomics Project, this site helps students learn modern concepts of gene structure by participating in genome research. The site is essentially an educational interface to the Apollo genome annotator, a research tool for editing "gene models" predicted by computer algorithms. Apollo was used to annotate the *Drosophila* genome, and we are adapting it for use with grain plants. The site's name emphasizes the gene both as a dynamic structure that changes through evolutionary time and as a dynamic concept that changes with our increasing knowledge of genome organization. The design for *Dynamic Gene* recalls the "streamlining movement" that influenced design during the middle of the 20th century with ideas borrowed from aviation and automobile design.

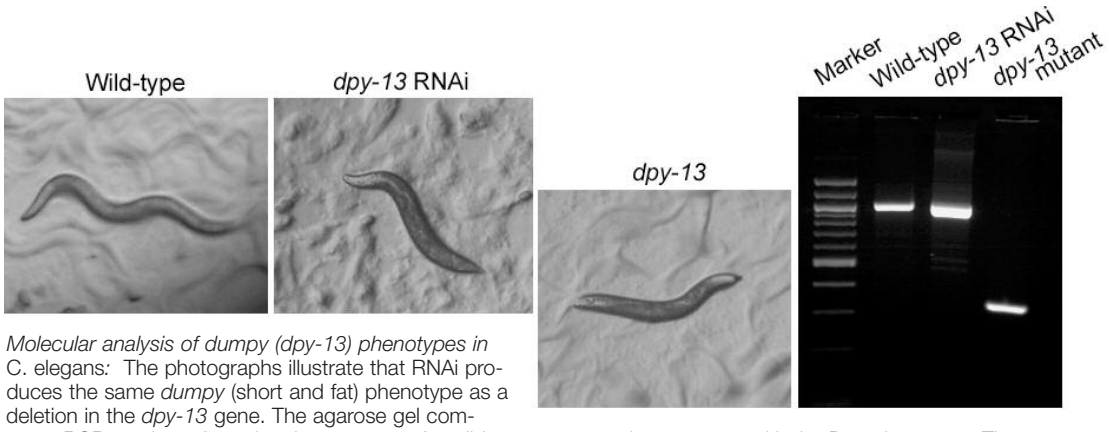




Students begin with tutorials that illustrate components of genes, and how different kinds of evidence for gene structure are gathered and compiled into gene models. Narrated videos capture the screen movements and commentary as an expert uses the Apollo research tool to solve common problems of gene annotation. Then, students can annotate sequences at several levels: (1) Beginners can construct gene models for individual genes, and then compare their models to a "correct" model provided by an expert annotator. (2) At the next level, students can tackle a number of genes assembled into an "artificial contig" and compare their models with curated results. (3) Advanced students, or whole classes, can take on the project of a contig containing a genome region that has not been hand-curated.

DNA KITS Learning Center

We also worked with the Carolina Biological Supply Company to develop a new line of *DNA Learning Center Kits* that stress the modern synthesis of molecular biology and computation. Each experiment in the series integrates in vitro experimentation with in silico bioinformatics. The experiments incorporate user-friendly features from the popular *DNA Science* lab-text, including flow charts, marginal notes, and extensive instructor information. Exclusive *Bio-i Guides* allow students to follow the recorded screen movements and mouse clicks of DNALC staff as they solve bioinformatics problems tailored to each experiment. A companion CD-ROM and Internet site provides exclusive access to the *Bio-i Guides* and additional e-learning tools that can be used in class or at home. Complete instructions for each experiment can be accessed as a unique virtual lab notebook, as well as printable PDF files. Animations on key techniques of molecular genetics and genomic biology are drawn from the DNALC's award-winning Internet site, *DNA Interactive.*



Molecular analysis of dumpy (dpy-13) phenotypes in C. elegans*:* The photographs illustrate that RNAi produces the same *dumpy* (short and fat) phenotype as a deletion in the *dpy-13* gene. The agarose gel compares PCR products from the *dpy-13* gene of a wild-type worm and two worms with the Dpy phenotype. The PCR products from wild-type and RNAi-induced *dpy-13* worms are identical, while the *dpy-13* mutant shows a shorter PCR product resulting from a chromosome deletion. This illustrates that RNAi silences gene function and produces a phenotype without altering the gene itself.

Bringing a Revolutionary Technology into the Classroom

With the complete human DNA sequence "in the bag," ahead lies the task of understanding the function of each gene and how it interacts with other genes. Such functional studies typically rely on mutating a particular gene, and then looking for its physical or behavioral effects in a living organism. Obviously, such studies cannot be carried out on human beings, so biologists rely on "model organisms" to shed light on elements of human physiology and cell biology. Although the microscopic worm *Caenorhabditis elegans* might seem an unlikely stand-in, it actually shares quite a lot of cell biochemistry with humans and has become a key model system in which to study gene function.

In recent years, the usefulness of the *C. elegans* model system has been dramatically enhanced because it is particularly suited to the revolutionary technique of RNA interference (RNAi). This method allows one to "silence" virtually any gene at will, within the context of a living organism. Amazingly, all that is required is for the worm to eat or be bathed in double-stranded RNA that is complementary to the part of the gene to be silenced. *C. elegans* is inexpensive to maintain, grows quickly (going from egg to adult in several days), and populates a culture plate with thousands of offspring that can be quickly screened for RNAi-induced phenotypes. For these reasons, we have invested in developing the *RNAi/C. elegans* system to bring functional genome analysis into precollege and beginning college classes.

As 2005 drew to a close, we had working prototypes of key experiments for our NSF-funded curriculum that explores the mechanism and uses of RNAi. With technical support from CSHL researcher Greg Hannon, a pioneer in RNAi technology, and an Advisory Panel–lead high school and college faculty, we are prepared to test experiments at workshops to be held in San Francisco, Oklahoma, and New York City in summer 2006.

The workshop will include an entire set of techniques for doing RNAi in *C. elegans*—beginning with observation of mutant phenotypes (physical and behavioral) and basic worm "husbandry." Participants then learn simple methods to induce RNAi and observe specific mutant phenotypes in manipulated worms. The mechanism of RNAi is investigated in two *C. elegans* strains with identical "dumpy" traits: one induced by RNAi and one caused by a chromosomal deletion. "Single-worm" polymerase chain reaction (PCR) is used to amplify DNA from the *dumpy* locus, and the DNA from wild-type worms is compared to DNA from RNAi and chromosomal mutants. Gel electrophoresis identifies the deletion in the mutant, but not in wild-type and RNAi-treated strains, providing evidence that RNAi does not alter the genetic code. In another experiment, a mutant phenotype is "rescued" (compensated for) by RNAi.

Participants also learn the process needed to silence any gene in the *C. elegans* genome, providing the possibility for student-centered research projects. Participants learn to use online sequence data to design primers to amplify part of a target gene and clone it into a feeding vector. The recombinant vector is then transformed into *Escherichia coli*, which, in turn, are fed to *C. elegans.* In addition, faculty will have access to the DNALC's own collection of RNAi-feeding strains that can be used to screen for a variety of mutant phenotypes. The importance of *C. elegans* as a model for higher organisms is highlighted by bioinformatics exercises that show the strong relatedness of worm genes and their human homologs.

Building a Revolutionary Internet Site

In 2005, we began development of *Genes to Cognition (G2C) Online*, a modern Internet site on current research on the molecular basis of human thinking and disorders of thinking. The project is revolutionary because it is being built in parallel with a major international research program—its namesake *G2C* at the Wellcome Trust Sanger Institute—and because it will employ a nonlinear, network structure designed to provide a personalized learning experience. Our objective is to build an Internet site that functions on several "meta" levels in that it:

- Reports on and is informed by current neuroscience research.
- Embodies a network structure analogous to the gene and cell networks that underlie cognition.
- Encourages individuals to reflect on their own thinking and learning.

The project was launched with the first meeting of the *G2C* Advisory Panel on March 11 at the CSHL Banbury Center. The 15 participants, from the United States and Europe, brought expertise from a number of fields that will be important to the success of the project, including neuroscience research, genetics and ethics issues, precollege and college science education, informal science education, project evaluation, and multimedia production. At the meeting, panelists were introduced to the challenges of producing a network-based Internet site, including building the database/meta-tag system, evaluating the system, and disseminating the system.

We relied heavily upon concept mapping during the first year of the project. Originally developed by Advisory Panelist and education pioneer, Joseph Novak, concept maps provide a visual method to condense and represent large bodies of knowledge in a meaningful way. Thus, we worked with Joe to elicit expert concept maps from leaders in key knowledge domains of importance to *G2C Online*. Merging the individual expert maps will create a master map, whose intersections (nodes) will suggest key concepts for which rich multimedia and inquiry modules will be developed. As part of this effort, we worked with advisory panelists Laura Maitland, Mary Colvard, and Caren Gough to develop concept maps of *G2C* content areas that are of direct relevance to high school/college biology and psychology curricula.

Concept maps will guide the development of the logic system of the *knowledge network*—a system of meta-tags to annotate content. Each item of content for *G2C Online* is being built as a standalone, independent medium item that occupies a specific space in a larger network of items, or nodes. As more content is added, and as more visitors use the site, a network engine will dynamically build and rebuild the network in accordance to the relationships between each node in terms of who uses them, how they are used, and the topics they encompass. The network structure should facilitate meta-cognition by helping the visitor make connections between concepts.

Concept mapping has suggested a three-dimensional array (below) to guide initial content development and meta-tagging. Thus, if site visitors are interested in autism, they will be able to view the disorder through a number of lenses that represent a continuum of approaches to science and phenomenological levels. Thus, autism is seen not only as a disorder of behavior, but a disorder of the brain, of neural circuits that make up the brain, of cells that make up these circuits, of proteins that signal within these cells, and, finally, of genes that encode these proteins.

Cognitive Disorders	Approaches to Science	Anatomical-Molecular Continuum
ADHD	Neuroimaging	Behavioral/Clinical
Alzheimer's	Electrophysiology	Anatomical: brain regions
Autism	Psychological/clinical	Physiological: neural circuits
Bipolar disorder	Family/epidemiological	Cell biological: signal transduction
Chronic pain	Bioinformatics	Molecular: DNA and genetic regulation
Depression	Historical	
Schizophrenia	Ethical	
Stroke and injury		

Hewlett Grant Completes Funding for *G2C* in the U.S.

From its compelling premise—to encourage students to think about the biology of thought—to its adaptive network architecture, to its strong connections to elite centers of biological research, *G2C Online* has the potential to set a high standard for educational technology. However, to prove its real worth as a model for others, this innovative project demands an equally rigorous evaluation and dissemination program. Thus, we were pleased when, in October, the William and Flora Hewlett Foundation added $470,000 to existing funding of $1 million from the Dana Foundation to support the evaluation and dissemination of *G2C Online*. The project is funded under the technology priority of Hewlett's education program, which aims to "improve access to exemplary postsecondary and K-12 educational content through a variety of approaches." The Hewlett grant will support several major objectives:

- *Integrate insights from cognitive and neuroscience research into Internet site construction.* As part of this objective, in Fall 2006, we will convene a high-level workshop at the CSHL Banbury Center to draw together 30–40 Internet site developers and experts from diverse field to conceptualize features of Internet sites of the future.
- *Determine how concept maps can support Internet site construction and student learning.* This objective supports the construction of expert concept maps to guide creation of the *G2C* "knowledge network" and classroom studies to determine how concept mapping supports student meta-cognition.
- *Demonstrate how Internet education materials developed alongside current research efforts can support and extend syllabus-centered teaching with examples of science process.* This objective will offer insight into how supplementary Internet materials can fit into a school system that is increasingly driven by standardized testing—with a focus on Advanced Placement Biology and Psychology.
- *Provide insight into how different audiences interact with multimedia content and how narrative versus exploratory modes influence understanding of neuroscience concepts*. This objective supports research on how students and teachers make use of the *G2C* knowledge network.
- *Distribute* G2C Online *to biology and psychology educators*. This objective will support nationwide training workshops for 480 biology and psychology teachers, as well as presentations at teacher professional meetings.

The Hewlett award puts us in the company of other high-level Internet developers. We are currently exploring partnerships with two other Hewlett grantees: public broadcaster WGBH and the Berkeley Lab's Center for Science & Engineering Education. The strength of both Dana and Hewlett support puts us in a strong position to realize our goal to obtain funding for a parallel evaluation and dissemination program in Great Britain.

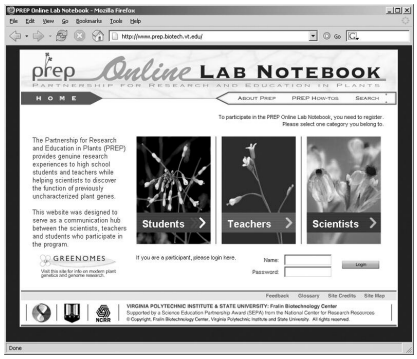
Internet Collaborations Extend Our Leadership

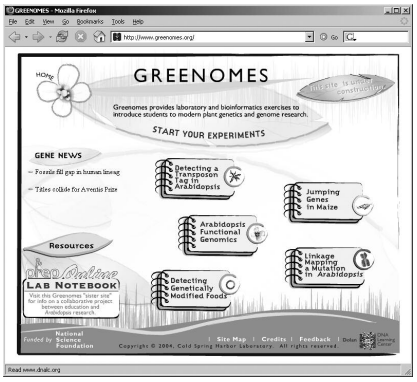
The DNALC participated in several high-level Internet collaborations in 2005. Key among these was the announcement in October of a $2.8 million consortium grant from the National Science Digital Library program of the NSF. Under the grant, the DNALC will receive $250,000 over 4 years to catalog and make over 100 hours of its proprietary Internet content available through the BiosciEdNet (BEN) Collaborative. Headed by the American Association for the Advancement of Science, the BEN Collaborative is primarily a cooperative of professional societies that are making their content available through the BEN portal. The DNALC is one of only several independent content producers, among more than 20 collaborators included in this second phase of the project.

The BEN Collaborative is part of the DNALC's ongoing effort to decompose its narrative content so that constituent content "molecules" and "atoms" can be searched for and viewed independently. The DNALC will make available, through the BEN Collaborative, multimedia elements from its eight major content sites. This will include approximately 200 content molecules (multimedia units, activities, lesson plans, and laboratories) and 5000 content atoms (individual multimedia items: animations,

video, photographs, and flat art).

We continued to participate in the development two Internet sites funded by the National Institutes of Health (NIH). The Cancer Biomedical Informatics Grid (CaBIG, https://cabig.nci.nih.gov/) is an Internet resource to share data and tools among cancer researchers. The DNALC is lending its expertise to the Training Work Space, which is creating standards and templates to help collaborators construct a unified knowledge base. We also collaborated with the Fralin Biotechnology Center at Virginia Tech to design and program an online platform for their NIH Partnership for Research and Education in Plants (PREP; www.prep.biotech.vt.edu/). This work was funded through the same NIH program that funded our *Inside Cancer* Internet site. The *PREP Online Lab Notebook* provides an environment to support student experiments with the model plant *Arabidopsis*. Students grow mutant and wild-type plants under various conditions, record their observations, and attempt to understand how mutations affect response to environmental stimuli. Plant scientists participate in the project by providing mutants and offering advice to participating students and teachers. The *PREP* Internet site coordinates with the DNALC's *Greenomes* site (www.greenomes.org), a set of molecular genetic experiments with *Arabidopsis* and corn.





Real and Virtual Visitors Increase

Real and virtual visitors continued to increase in 2005. During the year, the DNALC had 38,654 visitors, a 3% increase over the previous year. Key among these were 29,910 students and teachers who conducted lab experiments at the DNALC, in local schools, and at training workshops at sites around the world. Visits to the DNALC's family of Internet sites rose 13%, to 6.15 million. *DNA Interactive,* registered the largest increase (48%), followed by *Your Genes, Your Health* (32%) and *Genetic Origins* (28%). Much of this growth was due to a sophisticated indexing system that makes multimedia content more "visible" to search engines that are accustomed to html and text documents.

Internet Site	Average visit length (in minutes)	Visits in 2005	Increase from 2004 (%)
Gene Almanac	8:37	2,110,416	–1.20%
DNA from the Beginning	8:58	1,355,681	7.18%
Your Genes, Your Health	7:26	1,139,401	32.40%
DNA Interactive	7:27	964,919	48.43%
Image Archive on the American Eugenics Movement	8:54	286,403	1.06%
Bioservers	16:03	159,228	15.39%
Genetic Origins	7:38	140,318	28.71%
All Sites	**9:18**	**6,156,366**	**13.13%**

Taking into account that 60% of American Internet users now use high-speed connections, the DNALC updated two of its older Internet sites in Flash MX, the media integration standard for broadband. The Internet portal *Gene Almanac* was entirely reconceived. A scrolling "belt" across the middle of the screen provides access to nine DNALC Internet sites, and examples of more than 1000 multimedia items load randomly in a showcase window at top right. A drawing of the DNALC facility anchors the lower part of the screen along with access to DNALC services, and the correct phase of the moon plies the deep blue background above. *Image Archive on the American Eugenics Movement*, originally released in 2000, received a face-lift that gave it enhanced search features and added cross-referencing and interactive images. Users can now sort images by topic, time period, object type, and originating archive. Quick links allow users to access images from the same topic, time period, or archive. Image viewing has been simplified by Zoomify, which allows users to seamlessly move between low- and high-resolution images. (Rather than loading separate "normal" and "detailed" images files, Zoomify loads a single high-resolution image.) Visitors then interact with the image—panning across the image and zooming in at any point.

Students participating in camps in summer 2005.

Faculty Fellowships and Training

With the support from NSF and U.S. Department of Agriculture plant research programs, we hosted five biology faculty and two student fellows in the summer of 2005. Three faculty participated in the development of the *Dynamic Gene* Internet site: Robert Wheeler of Pine Creek High School (Colorado Springs), Dr. Debra Burhans of Canisius College (Buffalo, New York), and Cesar Gutierrez of John H. Reagan High School (Austin, Texas).

The second program, "Building Leadership to Expand Participation of Underrepresented Minorities in Plant Genetics and Genomics" is the educational outreach component of genome research conducted by CSHL researcher Dick McCombie. Two pairs of faculty-student fellows who spent 3 weeks at Cold Spring Harbor were funded by this NSF grant: Dr. Mary Smith and Timothy Raines from North Carolina Agricultural and Technical State University in Charlotte, North Carolina, and Dr. Muhammad Mian and Jonathan Gibbs from Rust College in Holly Springs, Mississippi. The student and faculty fellows participated in a mix of activities at the DNALC and the Hazen Genome Sequencing Center.

In 2005, we continued our NSF-funded *Greenomes* workshops to train college faculty to use our laboratory- and Internet-based curriculum, bringing students up to date with modern plant research. The objective is to use plant systems to illustrate major concepts of molecular and genomic biology, including the relationship between phenotype and molecular genotype, genetic modification of plants and detection of transgenes in foods, and linkage and bioinformatics methods for gene mapping.

Sixty-two faculty participated at weeklong *Greenomes* workshops conducted at San Jose State

University, California (site host Dr. Katy Korsmeyer), Cornell University, Ithaca, New York (site host Dr. Sharon Mitchell); and Virginia Polytechnic Institute and State University, Blacksburg, Virginia (site host Dr. Erin Dolan). We also collaborated with 2004 NSF fellows Dr. Javier Gonzalez-Ramos and Dr. Olga Kopp to conduct regional 3-day plant workshops at at Texas A&M University Agricultural Research and Extension Center in Weslaco and at the Utah Valley State College in Orem. Thirty-one high school and college faculty conducted experiments from the *Greenomes* curriculum.

In 2005 we partnered with Carolina Biological Supply Company (CBSC) to significantly expand our presence at teacher professional meetings. CBSC has distributed DNALC experiment kits to science teachers since 1986, so we were pleased when they offered to provide us free space in the large exhibits they organize for teacher meetings around the United States. Sharing exhibit space with CBSC—and cosponsoring workshops with them—allowed us to reach 381 educators at 11 mini-workshops held at five conventions: the National Science Teacher Association (NSTA) National Convention, Dallas, Texas; the National Association of Biology Teachers (NABT) National Convention, Milwaukee, Wisconsin; the California Science Teacher Association (CSTA) Annual Convention, Palm Springs, California; the Texas Science Teacher Association (CAST) Annual Meeting, Houston; and the National Science Teacher Association (NSTA), regional convention, Nashville, Tennessee.

Cold Spring Harbor Partnership

Since its founding in 1988, the DNALC's interaction with students has been limited to several hours during academic-year field trips or several days during summer DNA camps. In the fall of 2005, we realized a long-held goal of having a sustained relationship with students, when we welcomed our first class of 21 students from neighboring Cold Spring Harbor High School (CSHHS) into the CSH Partnership Program. The full-year course is cotaught by DNALC staff and CSHHS biology teacher Scott Renart. On alternating days, students spend their final two periods at the DNALC doing bio-chemical experiments or bioinformatics.

Under the program, CSHHS students have the opportunity to access experiment and computer technology developed by the DNALC over the past 20 years with more than $10 million in federal and foundation support. The students conducted a range of experiments in bacterial, plant, animal, and human systems that would typically be found in an upper-level biology elective at a major research university. Students learned principles of gene manipulation by making and analyzing recombinant DNA

Cold Spring Harbor High School students work with Dave Micklos in the computer laboratory. Newly-installed graphics depict DNA sequence from the mitochondrial control region studied in human genetics programs at the DNALC.

CSHHS biology teacher, Scott Renart, discusses the details of a molecular genetics laboratory with a student.

molecules in the bacterium *E. coli*. The class then moved on to study genome analysis in the model plants *Arabidopsis* and corn, to assay for transgenes in genetically modified (GM) food, and to explore newly sequenced genes in rice. In a unit on human genetics, students looked at variations in their own DNA, explored human origins, and performed a population study on the molecular basis of taste and smell. The year ended with the students testing our latest set of experiments using RNAi to silence genes in the nematode worm *C. elegans.*

Genetics as a Model for Whole Learning

Our middle school outreach program, *Genetics as a Model for Whole Learning* (GMWL), continues to offer a variety of age-appropriate activities and experiments designed to introduce 5–7th grade students to genetics. During the academic year, we worked closely with teachers and administrators to develop sequential programs that include in-school instruction by DNALC instructors, field trips to the DNALC, and in-service science training for teachers. Despite lean times for education in Long Island school districts, more than 60 school systems participated in the 2005 program, with 9900 students participating in lab field trips at the DNALC, and 9500 students receiving in-school instruction from DNALC staff.

In-school instruction typically included microscopic examination of cells, observing mutations in *Drosophila,* making DNA models, and studying the genetics of human traits. Armed with the basics of cell biology and genetics, students are then prepared for a culminating field trip to the DNALC. As in years past, the most popular field trip experiences included extracting DNA from bacteria, genetically engineering bacteria with a gene for bioluminescence, touring our interactive exhibit *The Genes We Share,* and solving *The Mystery of Anastasia* computer lab. A new lab, *CSI: Learning Center*, taps into the popular forensics theme of nighttime television. Students bring their enthusiasm for all things *CSI*, and we supply them with the DNA science behind crime scene analysis.

Many of the founding GMWL districts—including Syosset, Jericho, Great Neck, Locust Valley, and Half Hollow Hills—have gone on to develop sequenced genetics instruction at several grade levels taught by their own staff. These districts serve as models for other districts striving to meet new state and national teaching mandates in science. To aid in this effort, we now include information on how our labs align with New York State, Federal, and AAAS standards for science teaching.

Watson School of Biological Sciences

Our collaboration with the Watson School of Biological Sciences provides the CSHL graduate students with a unique teaching opportunity. Rather than the traditional training of graduate students as Teaching Assistants, Watson School students complete a spring rotation working with middle and high school students at the DNALC. During the course of 12 half-day sessions, students work in pairs under the tutelage of seasoned DNALC instructors.

During the first phase of the training, students observe a DNALC instructor deliver a laboratory to a visiting class. Postobservation, the students begin to organize a lesson plan, which integrates their own experience within the context of a specific experiment. The second phase is coteaching, during which each student is responsible for delivering a specific part of the laboratory. The third phase is independent instruction, during which the students work together to present an entire laboratory under the observation of the DNALC instructor. During each phase, students receive oral and written critiques aimed at strengthening their presentation and class management skills. After repeating this learning process at the middle school and high school levels, the students are required to independently teach an additional three lessons of their choice.

Some students opt to travel to a local school district to deliver instruction to several middle school classes. Although the CSHL graduate students are well versed in molecular biology, few have ever attempted to teach these concepts to young students. We believe that the skills required to deliver a successful lab experience to precollege students—engagement, organization, and time management—are the same skills needed to communicate with any audience.

Saturday DNA!

Saturday DNA! continues to involve families in hands-on, minds-on explorations of advances and issues in genetics. Each 2-hour program is designed for children 10–13 years of age (with an accompanying adult) or groups ages 14 through adult (with chaperone for participants under 15). During the year, we presented the "Best of *Saturday DNA!*"—rescheduling previously popular programs such as "RNAi: The Destroyer" and "Food for Thought."

New programs included "Walking Whales and Genetics Tales," which explored the ancient relationship between whales and hippos. Although these two animals are physically very different, participants used sequence analysis to show their close genetic connections. "Stem Cells: When Does Life Begin?" broke free of the traditional lab setting, allowing participants to explore the science behind stem cell research. Participants then used their newfound knowledge to defend a point of view in a debate on the social and ethical issues of stem cell research.

Staff and Interns

The management of the DNALC was significantly bolstered in 2005 with a number of high-level appointments. Uwe Hilgert was named assistant director, a post that had been vacant for several years. After joining the DNALC in November 2000, Uwe quickly took over bioinformatics instruction of a Howard Hughes Medical Institute program. He received a Ph.D. from the Max-Planck Institute for Plant Breeding in Cologne and conducted postdoctoral research at the University of Arizona. Uwe is responsible for managing the instructional staff and interns, for overseeing laboratory operations here and at DNALC *West*, and for organizing workshops and presentations at professional meetings.

John Connolly took the reins as lead producer for *G2C Online*. John recently received his Ph.D. in neuropsychology from Trinity College, Dublin. His background in neuroscience and sociological research will facilitate his work with the broad range of *G2C* collaborators. Bruce Nash and Greg Chin were specifically recruited to jump-start our effort to popularize *C. elegans* and RNAi in biology instruction. Bruce received his Ph.D. in medical and molecular genetics at the University of Toronto. He did postdoctoral research on cell division in *C. elegans* at the University of Oregon. Greg received his Ph.D. in developmental biology from Stanford University, followed by a postdoctoral period at the DNAX Research Institute and teaching at the University of California, Los Angeles.

Photo at left: Bruce Nash, Uwe Hilgert, John Connolly, and Greg Chin. Photo at right: Laura Johns, Stacy Leotta, and David Gundaker.

We were also pleased when Danielle Kearns-Sixsmith returned part-time to the DNALC to take on evaluation of the *G2C* site as part of her doctoral research in education at the University of Phoenix, Arizona. Formerly an education manager at the DNALC, she has a B.S. in biological sciences and M.S. degrees in secondary science education and educational leadership. David Gundaker joined the full-time staff as laboratory instructor. With a master's degree in teaching and experience in middle schools in Fort Collins, Colorado and on Long Island, Dave brings depth to the instructional group. In the fall, Stacy Leotta became a part-time member of the DNALC administrative staff. Laura Johns stepped in as part-time lab instructor, filling a gap when Elna Carrasco left on maternity leave. Laura has a bachelor's degree in genetic engineering, has done graduate work in marine chemistry, and has experience cloning ion channels at a small biotech company. Another new addition to the DNALC "family" came in August when middle school educator Erin Maroney was married to James McKechnie.

During the year, we bid farewell to five staff members at the DNALC: Judy Cumella-Korabik, Dr. Shirley Chan, Dr. Tom Bubulya, Dr. Craig Hinkley, and Tracy Behar. Program Manager since 1993, Judy instituted many of the successful administrative methods that helped the DNALC prosper over the last decade. Shirley was the first multimedia producer hired by the embryonic *Biomedia* Group in 1997 and did much of the editorial work for four major Internet sites: *DNA from the Beginning*, *DNA Interactive (DNAi)*, *Your Genes, Your Health (YGYH),* and *Inside Cancer*. She is now director of interactive media at Anatomical Travelogue in Manhattan. After helping to significantly reorganize the DNALC research and development component, Tom and Craig left their positions as scientific managers. Tom moved with his family to Dayton, Ohio, where he is an instructor in the Department of Biological Sciences at Wright State University. Craig and Tom worked as a team to develop and test new instructional protocols. Craig joined the biology department of Kingsborough Community College, CUNY. Tracy Behar left her position as laboratory instructor to teach science at Elwood High School.

High school interns continued to provide key support for our teaching labs, and several carried out independent research projects under the direction of DNALC and CSHL staff. Rachel Stephan (Kings Park High School), a new addition to the intern team, worked with Bruce Nash on an independent research project investigating the effect of known cancer genes on RNA interference.

Our sequencing service continued to grow with the help of college interns Alina Duvall (Hofstra University), Jennifer Aiello (C.W. Post), and newcomer Alexandra Sloane (Loyola College, Maryland). To process the growing number of requests, we now collaborate with Dr. Dick McCombie's group at the Woodbury Genome Center, where high-throughput capillary sequencing has greatly reduced the turnaround time.

Joining the intern program in 2005 were Matthew Giambrone (Walt Whitman High School), Ian Hogg (Friends Academy), Matthew Levy (Kings Park High School), Ronnie Morasse (Plainedge High School), Margarita Varer (Huntington High School), Nick Wilken (Kings Park High School), and Janice Yong (Kings Park High School).

Several interns returned from college to assist with summer workshops: Benjamin Blonde (Amherst College), Bryn Donovan (University of Delaware), Michelle Louie (George Washington University), Marie Mizuno (Binghamton University), and Alex Witkowski (SUNY, Albany).

In August, we bid farewell to the following interns as they began their freshman year at college: Regina Hu (Northport High School) is studying Professional Pharmacy at St. John's University; Kimberly Izzo (Kings Park High School) is pursuing a double-major in Biology and Vocal Performance at Indiana University; Andrew Langer (John H. Glenn High School, Elwood) is studying Computer Engineering at SUNY Binghamton; and Elena Melius (Oyster Bay High School) is studying business at Washington University in St. Louis.

David A. Micklos
Executive Director

2005 Workshops, Meetings, and Collaborations

January 8	*Saturday DNA!*, "A Bug's Life," DNALC
January 11	Site visit and museum tour for Watson School of Biological Sciences Students
February 3	Site visit and tour by Jim Parrish, Roger Phillips, Lisa Darmo, and Lawrence Wallace of Carolina Biological
February 12	*Saturday DNA!*, "CSI: Learning Center" and "Animal Models: Showing Off Genes," DNALC
February 15	West Side School Lecture
March 3	Site visit by Xiao-ya Chen, Ai-Zhen Zhang, Yu-lian Wu, Qi Qian, Rui Ming, and Gengxin Chen of Zhejiang University, China
March 9	Genetics Education Program for High School Biology Teachers
March 9	Site visit by Robert Ballard, Renea Hardwick, Kathy Kegley, and John Cummings of Clemson University, South Carolina DNALC
March 10–11	*G2C* Advisory Panel Meeting with Robert Ballard, Renea Hardwick, John Cummings, John Coffey, Mary Colvard, Seth Grant, Louise Gruenberg, Russ Hodge, Pauline Lowrie, Joseph D. McInerney, Joseph Novak, Sarah Robinson, Arati Singh, and Bronwyn Terrill, the Banbury Center
March 11	Site visit by WLIW (Channel 21); filming for "Ticket" about the cultural and public offerings at CSHL
March 15	Site visit by Neil Sandler and Darlene Backelman, Symphony Capital, New York
March 15–16	Genetics Education Program for High School Biology Teachers
March 21	Site visit by Jean Caron, Abby Demars, Jessica Powell, Gary Johnson, Irv Schloss, and Dennis Curran of DNA Epicenter, New London, Connecticut
March 22	Genetics Education Program for High School Biology Teachers
March 30–April 1	NSTA National Meeting, Dallas, Texas
March 31	West Side School Lecture
April 2	*Saturday DNA!*, "Food for Thought" and "When Dinosaurs Roamed the Earth," DNALC
April 4	*Great Moments in DNA Science* Honors Student Seminar, CSHL
April 5	Genetics Education Program for High School Biology Teachers
April 9	*Saturday DNA!*, "It's Not Just Scientists" and "Stem Cells: When Does Life Begin?," DNALC
April 11	*Great Moments in DNA Science* Honors Student Seminar, CSHL
April 14	Site visit and museum tour for Ed Blaskey, Commerce Bank, Melville, New York
April 18	*Great Moments in DNA Science* Honors Student Seminar, CSHL
April 22	Site visit and tour by Jim Chinitz, VP Enzo BioChem, Farmingdale, New York
April 29	Site visit by Robert Frehse, Executive Director of The William Randolph Hearst Foundation, Manhattan, New York
May 3	Site visit by Tahashi Hirata, Chairman, and Hirofumi Nakano, Research Fellow of Kyowa Hakko Biofrontier Laboratories, Tokyo, Japan
May 9–11	*Human DNA Variation, Populations, and Medicine* Meeting for Novartis Oncology
May 14	*Saturday DNA!*, "Walking Whales and Genetic Tales" and "Is There a Neanderthal in Your Family Tree?," DNALC
May 23	Site visit and tour by Jon Cooper, Suffolk County Legislature, Huntington, New York
May 24	Site visit and tour by Janet Jones, Director of Community Affairs at Verizon, Garden City, New York
May 25	Huntington High School Young Professional Group Meeting hosted by Public Affairs Office
June 2	Site visit by Kidgie Williams, diplomats and family members of UN representatives, hospitality committee for United Nations Delegations, Inc., Manhattan, New York
June 6–8	NSF *Plant Molecular Genetics and Genomics* Workshop, Orem, Texas
June 11	*Saturday DNA!*, "The Fluid of Life" and "RNAi: The Destroyer," DNALC
June 15–17	NSF *Plant Molecular Genetics and Genomics* Workshop, Weslaco, Texas
June 20–24	NSF *Greenomes* Workshop, San José, California
June 21	Site visit by Joe Novak, Institute of Human and Machine Cognition (IHMC), Florida; Laura Maitland, AP Psychology Consultant; and Mary Colvard, Education Consultant
June 21	Site visit by Tom Dolan, Principal; Scott Renart, Science Teacher; and 70 students and parents from Cold Spring Harbor High School
June 25–July 9	NSF Faculty Fellowship, Robert Wheeler, Pine Creek High School, Colorado Springs
June 26–July 16	Site visit by Ai Hoon Soh, Meridian Junior College, and Peow Ming Foo, Victoria Junior College, Singapore

June 27–June 30	*Fun with DNA* Workshop, DNALC
	Fun with DNA Workshop, DNALC *West*
	World of Enzymes Workshop, DNALC
June 27–July 2	NSF Faculty Fellowship, Dr. Debra Burhans, Canisius College, Buffalo, New York
June 27–July1	Site visit by Judy Holwell, University of Georgia
July 3–16	USDA Faculty Fellowship, Charlie Gutierrez, John H. Reagan High School, Austin, Texas
July 5–8	*Fun with DNA* Workshop, DNALC
	Green Genes Workshop, DNALC *West*
	Green Genes Workshop, DNALC
July 7	Site visit by William Fair, VP, Monique Salazar, and Dun Wang from East River Science Park/NYC Economic Development Corporation, Manhattan, New York
July 7	Site visit by Christopher Richie, National Institute for Diabetes and Digestive and Kidney Diseases, NIH
July 8	*G2C Online* Interview with Jeffrey Lieberman, Columbia University, New York
July 10	NSF Faculty Fellowship, Mary Smith and Timothy Raines, North Carolina State University, Greensboro, North Carolina; and Muhammad Mian and Jonathan Gibbs, Rust College, Holly Springs, Mississippi
July 11	*G2C Online* Interview with David Porteous, University of Edinburgh, United Kingdom
July 11–15	*World of Enzymes* Workshop, DNALC
	Genetic Horizons Workshop, DNALC
July 12	G2C *Online* Interview with Daniel Weinberger, National Institute of Mental Health, Maryland
July 13	*G2C Online* Interview with Pat Levitt, Vanderbilt University, Tennessee
July 18	*G2C Online* Interview with Sukhi Shergill, Kings College London, United Kingdom
July 18–22	*Fun with DNA* Workshop, DNALC
	Green Genes Workshop, DNALC
July 25–29	*World of Enzymes* Workshop, DNALC
	Green Genes Workshop, DNALC
July 25–29	Bioinformatics in the Classroom Workshop, St. Paul, Minnesota
July 26	Site visit by Frank Posillico, President of Rose Racanelli Real Estate, Dolan DNALC Corporate Advisory Board member
July 27	Site visit and tour by Kaoru Ushijima, Director, Museum Management Division, Chiba Prefectural Government, Tashiro, Director/Curator of the Japan Science Foundation, and translator, Chiba, Japan
August 1	*G2C Online* interview with Karim Nader, McGill University, Canada
August 1	Site visit by Arthur Spiro, CSHL Trustee, and Cary and Lisa Kravat of Kravat Fabrics
August 1–5	NSF Plant Genetics Workshop, Ithaca, New York
August 1–5	*Fun with DNA* Workshop, DNALC
	World of Enzymes Workshop, DNALC *West*
	Genetic Horizons Workshop, DNALC
August 3	*G2C Online* interview with Earl Miller, Massachusetts Institute of Technology
August 3	*G2C Online* interview with Howard Eichenbaum, Boston University, Massachusetts
August 3	Site visit by Doug Sipp, Miki Murase, Naoki Nambi, and Toshitsugu Hirauchi of the Ricken Center for Developmental Biology, Japan
August 4	*G2C Online* interview and site visit by Seth Grant, Wellcome Trust Sanger Institute, Cambridgeshire, United Kingdom, and Joseph Novak, Institute of Human and Machine Cognition (IHMC), Florida
August 5	*G2C Online* interview with Ron Davis, Baylor College of Medicine, Texas
August 8-12	*Fun with DNA* Workshop, DNALC
	Green Genes Workshop, DNALC
August 8–12	NSF Plant Genetics Workshop, Blacksburg, Virginia
August 10–12	Site visit by Laura Maitland, AP Psychology consultant, New York
August 15–19	Genomic Biology, PCR, and Bioinformatics Workshop, Aspen, Colorado
August 15–19	*Fun with DNA* Workshop, DNALC
	World of Enzymes Workshop, DNALC
	Genetic Horizons Workshop, DNALC
August 16–19	Site visit by Laura Maitland, AP Psychology consultant, New York
August 22–26	*Fun with DNA* Workshop, DNALC
	World of Enzymes Workshop, DNALC
August 25	Site visit and tour by the Champalimaud Foundation, Lisbon, Portugal

August 29–Sept. 2	*World of Enzymes* Workshop, DNALC
August 29–31	Site visit by Laura Maitland, AP Psychology consultant, New York
August 30	Site visit and tour by Marianne Carlton, Director of Internal Communications, and James Cuniglio, Communications Coordinator, Arrow Electronics, Melville, New York
September 12	Public Meeting for Long Island ALS families on ALS research
September 13	Cold Spring Harbor High School Partnership Program commences
September 14	Site visit by Brad Stefanoni, Director of Business Partnerships, and Lisa Blair, Science Education Center Director from Southeast Kansas Education Service Center, Greenbush
September 28	Site visit by Jane Block, former Dolan DNALC Corporate Advisory Board member
October 5–9	NABT National Convention, Milwaukee, Wisconsin
October 7	*G2C Online* Interview with Davie Van Vactor, Harvard Medical School, Massachusetts
October 15	*Saturday DNA!*, "The Building Block of Life" and "Food for Thought," DNALC
October 17	"Building Family Programs" panel presentation by Long Island Museum Association
October 19	Site visit by Rob Dickstein of Pall Corporation, Dolan DNALC Corporate Advisory Board member
October 24	West Side School Lecture
October 25–29	ASHG Convention, Salt Lake City, Utah
October 27–29	CAST Convention (Texas Science Teachers), Houston
October 27–29	CSTA Convention (California Science Teachers), Palm Springs
October 30	Site visit by Long Island Association (LIA)
November 2	Site visit by Christine Leonardis, Manager Business Development from Long Island Works Coalition
November 7	Site visit by Chris Barlow-Stewart from the University of Sydney, Australia
November 8–9	STANYS Conference, Ellenville, New York
November 9	Excellence in Science Award Reception for the American Association of University Women, Huntington Branch
November 11	Site visit by Scott Livingston, Managing Partner from Axiom Capital Management, Manhattan, New York
November 12	*Saturday DNA!*, "CSI: Learning Center" and "Is There a Neandertal in Your Family Tree?," DNALC
November 16	Site visit by members of the Three Harbors Garden Club, Chapter of Garden Club of America, Cold Spring Harbor area
November 17	Site visit by Ed Guiliano, President of New York Institute of Technology, and Lexa Logue, Provost
Nov. 21–Dec. 9	Teacher Training Workshop, National Institute of Education and Singapore Science Center, Singapore
November 28	Site visit by Dori and Peter Tilles (Doris M. and Peter S. Tilles Foundation) and Pat and Edward Travaglianti (CSHL Trustee and President of Commerce Bank of Long Island)
Nov. 28–Dec. 10	Teacher training at the DNALC, Tan Chwee Li, Fengshan Primary School; Ngian Bang Yee, Seng Kang Primary School; Chua Yen Ling, Monfort Junior School; and Yean Sok Kheng, Yio Chu Kang Primary School; Singapore
December 1–3	NSTA Southern Area Convention, Nashville, Tennessee
December 10	*Saturday DNA!*, "The Mystery of Anastasia Romanov" and "RNAi: The Destroyer," DNALC
December 30	Site visit by Janos Posfai from New England BioLabs, Inc.

Sites of Major Faculty Workshops 1985–2005

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

ALABAMA	University of Alabama, Tuscaloosa	1987–1990
ALASKA	University of Alaska, Fairbanks	1996
ARIZONA	Tuba City High School	1988
ARKANSAS	Henderson State University, Arkadelphia	1992
CALIFORNIA	**California State University, Fullerton**	**2000**
	Canada College, Redwood City	1997
	Contra Costa County Office of Education, Pleasant Hill	2002
	Foothill College, Los Altos Hills	**1997**
	Harbor-UCLA Research & Education Institute, Torrance	2003
	Laney College, Oakland	1999
	Lutheran University, Thousand Oaks	1999
	Pierce College, Los Angeles	**1998**
	Salk Institute for Biological Studies, La Jolla	2001
	San Francisco State University	**1991**
	San Jose State University	**2005**
	University of California, Davis	1986
	University of California, Northridge	**1993**
COLORADO	Colorado College, Colorado Springs	1994
	United States Air Force Academy, Colorado Springs	**1995**
	University of Colorado, Denver	1998
CONNECTICUT	Choate Rosemary Hall, Wallingford	1987
FLORIDA	North Miami Beach Senior High School	1991
	University of Western Florida, Pensacola	1991
	Armwood Senior High School, Tampa	1991
	University of Miami School of Medicine	2000
GEORGIA	Fernbank Science Center, Atlanta	1989
	Morehouse College, Atlanta	**1991, 1996**
	Morehouse College, Atlanta	1997
HAWAII	Kamehameha Secondary School, Honolulu	1990
ILLINOIS	Argonne National Laboratory	1986, 1987
	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	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
	St. John's College, Annapolis	*1991*
	University of Maryland, School of Medicine, Baltimore	**1999**
	National Center for Biotechnology Information, Bethesda	2002
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
	Winsor School, Boston	1987
	Whitehead Institute for Biomedical Research, Cambridge	2002
MICHIGAN	Athens High School, Troy	1989
MINNESOTA	University of Minnesota St. Paul, St. Paul	2005
MISSISSIPPI	Mississippi School for Math & Science, Columbus	1990, 1991
MISSOURI	Stowers Institute for Medical Research, Kansas City	2002
	Washington University, St. Louis	1989
	Washington University, St. Louis	**1997**
NEW HAMPSHIRE	**New Hampshire Community Technical College, Portsmouth**	**1999**
	St. Paul's School, Concord	1986, 1987
NEVADA	University of Nevada, Reno	1992
NEW JERSEY	Coriell Institute for Medical Research, Camden	2003
NEW YORK	Albany High School	1987
	Bronx High School of Science	1987

	Columbia University	**1993**
	Cold Spring Harbor High School	1985, 1987
	Cornell University, Ithaca	**2005**
	DeWitt Middle School, Ithaca	*1991, 1993*
	Fostertown School, Newburgh	*1991*
	Huntington High School	1986
	Irvington High School	1986
	Junior High School 263, Brooklyn	*1991*
	Lindenhurst Junior High School	*1991*
	Mt. Sinai School of Medicine	1997
	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	1998–1999
	The Rockefeller University	2003
	Titusville Middle School, Poughkeepsie	*1991, 1993*
	Trudeau Institute, Lake Saranac	2001
	Union College, Schenectady	2004
	US Military Academy, West Point	**1996**
	Wheatley School, Old Westbury	1985
NORTH CAROLINA	Center for Health Research, Triangle Park	2003
	North Carolina School of Science, Durham	1987
OHIO	Case Western Reserve University, Cleveland	1990
	Cleveland Clinic	1987
	North Westerville High School	1990
OKLAHOMA	**Oklahoma City Community College**	**2000**
	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
SOUTH CAROLINA	**Clemson University, Clemson**	**2004**
	Medical University of South Carolina, Charleston	1988
	University of South Carolina, Columbia	**1988**
TEXAS	Austin Community College-Rio Grande Campus	2000
	J.J. Pearce High School, Richardson	1990
	Langham Creek High School, Houston	1991
	Southwest Foundation for Biomedical Research, San Antonio	2002
	Taft High School, San Antonio	1991
	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**
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**
WASHINGTON	Fred Hutchinson Cancer Research Center, Seattle	1999, 2001
	University of Washington, Seattle	**1993, 1998**
WASHINGTON, D.C	**Howard University**	**1992, 1996**
WEST VIRGINIA	Bethany College	1989
WISCONSIN	Blood Center of Southeastern Wisconsin, Milwaukee	2003
	Madison Area Technical College	**1999**
	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
CANADA	Red River Community College, Winnipeg, Manitoba	1989
ITALY	Porto Conte Research and Training Laboratories, Alghero	1993
	International Institute of Genetics and Biophysics, Naples	1996
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	1995
	Uppsala University, Uppsala	2004

DOLAN DNA LEARNING CENTER GRANTS

Grantor	*Program/Principal Investigator*	*Duration of Grant*	*2005 Funding*[+]
FEDERAL GRANTS			
National Science Foundation	Developing and Disseminating New Laboratories in RNAi and Functional Genomics	06/04–06/06	$ 234,536
National Science Foundation	VCA: Finishing the Rice Genome	09/04–08/06	84,041
National Science Foundation	VCA: Gramene: A Platform for Comparative Genomics	12/04–11/06	113,118
National Institutes of Health	*Inside Cancer*, Multimedia Education Resources for Cancer	01/03–12/05	43,642
Virginia Tech/NIH	Partnership for Research and Education in Plants	09/04–10/05	40,501
U.S.D.A.	Systematic Determination of the Gene Set	02/04–01/06	636
NONFEDERAL GRANTS			
Carolina Biological Supply Company	Research Support	2005	$ 75,000
Clemson University	License, training, and development	2005	50,000
Dana Foundation	*Genes to Cognition (G2C) Online:* A Network-driven Internet Site on Modern Brain Research	10/04–09/06	243,912
Dialog Gentechnik	License, training, and development	2005	12,475
Hewlett Foundation	*Genes to Cognition (G2C) Online*	10/05–10/06	12,922
North Shore–LIJ Health System	DNALC *West* support	2005	50,000
Singapore Ministry of Education	License, training, and development	2005	100,000

The following schools each awarded a grant of $1,000 or more for the *Curriculum Study* Program:

Bellmore–Merrick Central High School District	$ 1,250	Long Beach City School District	$ 1,250
Commack Union Free School District	1,250	North Shore Central School District	1,250
East Meadow Union Free School District	2,500	Oceanside Union Free School District	2,500
Elwood Union Free School District	1,250	Oyster Bay–East Norwich Central School District	1,250
Great Neck Union Free School District	1,250	Plainedge Union Free School District	2,500
Green Vale School	2,500	Plainview–Old Bethpage Central School District	1,250
Half Hollow Hills Central School District	2,500	Port Washington Union Free School District	2,500
Harborfields Central School District	1,250	Portledge School	1,250
Herricks Union Free School District	1,250	Ramaz Upper School	2,500
Island Trees Union Free School District	1,250	Roslyn Union Free School District	1,250
Jericho Union Free School District	1,250	Sachem Central School District	1,250
Kings Park Central School District	2,500	Syosset Central School District	2,500
Levittown Union Free School District	1,250	West Hempstead Union Free School District	2,500
Locust Valley Central School District	1,250	Yeshiva University High School for Girls	1,750

The following schools each awarded a grant of $1,000 or more for the *Genetics as a Model for Whole Learning* Program:

Baldwin Union Free School District	$ 1,200	Lynbrook Union Free School District	$ 1,360
Bayshore Union Free School District	2,160	Mattituck–Cutchogue Union Free School District	1,700
Bellmore Union Free School District	3,100	Merrick Union Free School District	1,100
Bellmore–Merrick Central School District	6,900	Middle Country Central School District	1,660
Bethpage Union Free School District	1,800	North Bellmore Union Free School District	1,070
Brandeis School	1,375	Old Westbury School of the Holy Child	2,165
East Meadow Union Free School District	2,180	Oyster Bay–East Norwich Central School District	2,357
Elwood Union Free School District	3,750	Port Washington Union Free School District	19,505
Floral Park–Bellerose Union Free School District	5,150	PS 175, Region 3	15,000
Friends Academy	2,030	Rockville Centre Union Free School District	4,695
Green Vale School	1,527	Scarsdale Union Free School District	2,100
Half Hollow Hills Central School District	6,300	South Huntington Union Free School District	7,225
Harborfields Central School District	12,360	St. Dominic Elementary School	3,630
Herricks Union Free School District	1,920	St. Edward the Confessor School	1,650
Huntington Union Free School District	5,827	Syosset Union Free School District	27,260
Lawrence Union Free School District	7,618	Three Village Central School District	2,665
Locust Valley Central School District	1,560		

[+]Includes direct and indirect costs

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(cover images from artwork by Great Neck South Middle School students.)