

# HUMAN GENETICS EDUCATION FOR MIDDLE AND SECONDARY SCIENCE TEACHERS

## Progress Report

for Period April 1, 1994 - March 31, 1995

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**MASTER**

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# **HUMAN GENETICS EDUCATION FOR MIDDLE AND SECONDARY SCIENCE TEACHERS**

## **Third Annual Report**

### **April 1, 1994 - March 30, 1995**

#### **I. OBJECTIVE**

This project is designed to increase teachers' knowledge of the Human Genome Project (HGP) with a focus on the ethical, legal and social implications of genetic technology. The project provides educators with the newest information on human genetics including applications of genetic technology, updated teaching resources and lesson plans, peer teaching ideas to disseminate genetic information to students and other educators, and established liaisons with genetic professionals.

#### **II. PROJECT DESIGN**

A four phase program during two school years including two consecutive summer workshops:

##### **PHASE I: FIRST ONE WEEK WORKSHOP**

The first one week workshop emphasized the ethical, legal and social implications of Human Genome Project technology through interaction with professionals familiar with HGP/ELSI issues including: geneticists, genetic counselors, educators, researchers, ethicists, attorneys, and consumers (individuals with genetic conditions or those who utilize genetic services). Participants attended didactic lecture sessions, family panels, ethics panels, laboratory hands-on activities, laboratory tours, and role play sessions to obtain content and resources for classroom applications.

##### **PHASE II: CLASSROOM USE OF MATERIALS AND INFORMATION**

During the school year teachers used the DOE / BSCS curriculum *Mapping and Sequencing the Human Genome: Science, Ethics and Public Policy* as well as other curricular ideas from the workshop with their students. These new curricula foster an increased level of understanding and comfort in teaching about the Human Genome Projects' ethical, legal and social implications. Teachers developed and updated lesson plans, initiate mentor relationships, and introduced students to genetic information.

##### **PHASE III: SECOND ONE WEEK WORKSHOP**

After using new curricular materials and information with their students, teachers returned the following summer for a second workshop. During the workshop they shared experiences; exchanged successful teaching methods, lesson plans, curriculum concepts, and integration methods; discussed curricular changes; and focused on ideas for peer teaching. Workshop sessions updated teachers on cutting-edge HGP information to establish a solid foundation of knowledge. Additional family panels, ethics discussions, lab tours, hands-on activities, as well as online Internet sessions, helped coalesce all of the project elements.

##### **PHASE IV: DISSEMINATION PROGRAMS**

After the two summer workshops, participants organized in-services and workshops for their colleagues, and presentations at district, state and national teacher meetings to circulate new information and resources about the Human Genome Project and ELSI issues.

## PROGRESS

- A one week workshop was held for 89 teachers in June 1994. (see Workshop Agenda in Appendix A)
  - 31 teachers completed Phase I and began Phase II
  - 58 teachers completed Phase III
  - 27 participants completed Phase IV
- 44% (27) completed at least part of phase IV during the 1994-95 school year.
- 99 mentors were available in 1994.
- 56 participants collaborated with mentors in 1994. (see Collaborations in Appendix H)
- 90 peer teaching sessions occurred (see Dissemination and Networking in Appendix I)
- 115 educators have participated in the project with an impact on approximately 2,875 peer teachers.
- These Approximately 2,990 teachers impact more than 434,700 students during the project.
- Project cost: \$1.37 per student
- Workshop participants completed different phases of the project this year:

	Jun 94	Sep 94 - May 95	
Group 1	Phase III 14	Phase IV	
		4 partial	11 complete
Group 2	Phase III 58	Phase IV	
		16 partial	20 complete
Group 3	Phase I 31	Phase II 31	

## III. 1994 WORKSHOP DESCRIPTION

### SPEAKERS

Professionals with first hand expertise in helping families deal with the complex decisions of new genetic technology presented didactic, interactive sessions. The speakers included genetic counselors, clinical geneticists and laboratory geneticists. Other speakers were lawyers and ethicists familiar with HGP / ELSI and public policy issues, researchers using DNA technology, curriculum developers, consumers, and teachers experienced in presenting HGP / ELSI topics in their classrooms. (see Presenters List in Appendix B)

An Educational Outreach Program Coordinator demonstrated activities including an electrophoresis laboratory, chromosome laboratory, DNA sequencing activity, and PCR technology laboratory. Case studies, role play, demonstrations, and discussions reinforced the application of technology and its integral role in ELSI. As well, lead teachers presented hands-on classroom activities and exercises to

promote inquiry and discussions about the applications of genetic technology and the acquisition of laboratory equipment.

Speakers conducted a variety of sessions:

- clinical lectures
- computer access demonstrations
- educational issues sessions
- ethics dialogues
- family panels
- Human Genome Project lectures
- legal discussions
- probability exercises
- public policy lectures
- social issues talks
- technological sessions
- review of genetics resources
- BSCS curricular demonstrations

Speakers addressed topics including:

- basic human genetics concepts
- Human Genome Project
- Genetic counseling process and medical genetics
- Ethical, legal and social implications of the HGP
- Biotechnology
- Careers in human genetics
- The Internet and information access
- Peer teaching
- Educational resources

### **FAMILY PANELS**

Family panels gave educators a humanistic context about genetic conditions unavailable from any other source. The families' personal stories supplement textbook descriptions and expand knowledge of the human perspectives of genetic technology. Textbooks often present worse-case scenarios when describing genetic conditions. These textbook descriptions, frequently the only information available to teachers, are more appropriate to educate medical students or other health care professions about diagnosis. They are less appropriate for the public in their understanding of genetic conditions.

Family panels promote a different perspective. they are a valuable way to understand the impact of genetic technology on the decisions made by individuals and family members. Teachers have reported that family panels are the most valuable aspect of the workshop; that they can no longer teach human genetic conditions in the same textbook-based way; that they now think of, and teach about individuals with genetic conditions as members of families, communities, and society, not just "a disease" described in a book. One participant stated: "Excellent comments about self-worth, discrimination, quality of life decisions." Another stated: "Panels are the best part of the workshop: so relevant and touching."

The interactive panel format uniquely affected the attitudes of teachers about the social, ethical and legal implications of having a genetic condition. Families presented information on the influence genetic conditions have on their lives, and discussed misconceptions about their condition. One participant commented: "Moving and amazing stories. We must as teachers be more sensitive to any possible gene condition that may be out there among our students." (See comments in Appendix C)

Panels of family members presented information on the impact of genetic conditions. The following conditions were represented:

- Cornelia de Lange syndrome
- cri-du-chat syndrome
- dystonia
- Down syndrome
- Ehlers-Danlos syndrome
- Huntington disease
- ichthyosis
- Marfan syndrome
- neurofibromatosis
- proteus syndrome
- retinitis pigmentosa
- Rubinstein-Taybi syndrome
- short stature
- Von Hippel-Lindau syndrome

### **LABORATORY TOURS**

Participants toured local laboratory facilities where demonstrations of real world uses of biotechnology gave them a clearer understanding of the genetic technology they simulate in their classroom. (See Laboratory Tour Descriptions in Appendix D)

These labs included:

- biotechnology support facility [oligonucleotide synthesis, protein synthesis analysis]
- clinical laboratory [histocompatibility, DNA testing, bone marrow and organ transplant]
- cytogenetic laboratories [karyotyping, FISH]
- forensic laboratories [using PCR and RFLP technology]
- molecular genetics laboratories [cystic fibrosis and Duchenne muscular dystrophy]
- organ bank [histocompatibility, DNA testing]
- paternity testing [using PCR and RFLP technology]
- research laboratories [colon cancer, DNA data analysis, DNA sequencing, protein mapping]

Laboratory tours help teachers understand the ways genetic technology is used in clinical, research, and forensics settings. One participant commented: "Really interesting information. It is good to see the actual labs and see the process." Teachers were exposed to the equipment and technology of a laboratory setting, as well as career opportunities available to students soon to be entering college or the work force. The laboratory directors and technologists' expertise were an asset to our program.

Participants felt that lab tours were one of the highlights of the week. One participant stated: "Obviously Dr. Fechtel is very interested in her field. Her enthusiasm for science would communicate well to high school students." Another said: "Excellent presentation raising many wonderful ethical issues. It was one of the highlights of the day." Still another commented: "Mr. Wilson was an excellent presenter: he explains things so well. I finally understand DNA probes thoroughly."

### **RESOURCES**

#### **Educational Materials**

Educators were able to review current resources on human genetics, ethical, legal and social topics of human genetics, genetic technology, and the Human Genome Project. All workshop participants received 23 different resources and materials to update their curricula this year.

A resource room was set-up for participants to practice new computer software on genetics; access current genetics information on-line; and view videotapes on genetic conditions, genetic technology, careers in genetics, laboratory techniques, and the Human Genome Project. New curricula, textbooks, reference materials, and hands-on kits were available for teachers to review to attain new teaching ideas.

In 1994, 58% of the participants (46 teachers) received materials ordered from matching funds attained through school, administration or regional educational funding sources. 31 new participants received matching funds information to attain funds from their school administrator for materials. 3 new participants have ordered materials with matching funds to date. (See Educational Resource List in Appendix E)

### **Lesson Plan Exchange**

An important component of the workshop is an exchange of teaching ideas and resources. Teachers presented their classroom ideas to each other during the workshop and discussed ways of modifying lesson plans to incorporate the broad scope of Human Genome Project implications into their classroom discussions. One participant commented that "It is wonderful to network with teachers from all parts of the country. Many tried, tested and perfected activities were shown. I found it most helpful." Another stated, "I have learned and seen so many excellent things. I see a great Human Genetics unit developing from this material that I hope to develop, teach, publish and present next year!"

(See Teacher Presentations, Lesson Plans and Teaching ideas in Appendix F)

## **IV. MENTOR NETWORK**

The mentor network helps teachers remain current on new developments and changes in genetics. Once teachers begin integrating and expanding their human genetics curricular content, frequently they and their students have specific questions regarding clinical aspects of genetic conditions including legal, social, and ethical topics. Throughout the project, participants are linked with Mentors: professionals who assist them with the development and implementation of curricular materials to provide ongoing support, information, and resources.

A large database has been established of professionals willing to assist teacher with curricular content. These professionals with expertise in genetics or in ELSI topics have been recruited through notices in professional genetics journals (*American Society of Human Genetics Journal*, *Perspectives in Genetic Counseling*, and *Human Genome News*), through professional meetings (American Society of Human Genetics national meetings, National Society of Genetic Counselors national meetings, and HUGO), and through personal contacts at ELSI or DOE Project Directors Meetings.

The mentors, some of whom have access to funds for teacher education programs through state or regional sources, were given the names of teachers in their CORN (Council of Regional Networks) Region. And, each teacher received a list of Genetic Resource Professionals in their region. Each mentor agrees to 2-3 half days per year of collaboration with science educators by helping teachers develop and implement genetic lesson plans, providing laboratory tours, agreeing to speak at state teacher meetings, allowing student to observe during genetics clinics, giving classroom presentations, and preparing slides for teacher presentations.

Currently 99 mentors have volunteered to help teachers. These professionals include:

- 8 Clinical Geneticists
- 5 Educators
- 1 Ethicist
- 61 Genetic Counselors
- 1 Genetics Nurse Specialist
- 5 Laboratory Geneticists
- 1 Science Lecturer
- 15 Medical Geneticists
- 1 Metabolic Dietician
- 1 Science Writer

(See Mentors List in Appendix G)

Participants have initiated 56 collaborations with genetics and ELSI professionals. These collaborations include:

- acquiring current genetics resources
- arranging laboratory tours for students
- assisting with summer workshops for teacher
- discussing genetic research with students
- loaning slides for genetic presentations
- making contacts with speakers for classroom presentations and inservice workshops
- organizing and moderating family panels
- presenting genetic information to students
- participating in planning committees for peer teaching workshops
- providing answers to students' genetics questions
- providing case examples of genetic counseling sessions for students
- providing students with career information

(See Collaborations List in Appendix H)

## V. DISSEMINATION

The project is designed to prepare teachers to serve as Genetic Resource Specialists throughout their state and CORN region by providing information and demonstrating new resource materials to their colleagues. During the workshops, participants acquired methods to update curriculum in their classroom and acquire new information throughout their professional lives.

In 1994, 39 teacher conducted 90 in-services to more than 5550 teachers and members of the general public. Dissemination was done at regional or national conventions, state meetings, district workshops, and teacher in-services.

Dissemination is the driving force of the *Genetics Education for Middle and Secondary Science Teachers* project. Teachers' networking with peers and colleagues broadens the impact of summer workshops and enables other educators to be exposed to the immense amount of information available. This helps insure that educators begin teaching about the complex concepts and decisions intrinsic to the Human Genome Project in a cohesive and sensitive manner. (See Dissemination and Networking in Appendix I)

Susan Sprouse, a 1993-94 workshop participant stated her view of dissemination:

*(The 95 teachers at the California Science Teachers Association's 3rd Annual Statewide Conference in Palm Springs) agreed that this material is vitally important for biology teachers to be presenting to their classes...We were all surprised and disappointed at the lack of workshops at the conference on ethics, HGP or genetics.*

*I am grateful you took a chance on me, because I am certainly excited about your program and am definitely talking about it with anyone who will listen!*

*Your workshop was an outstanding experience for me, and it is exciting to see just how far the information may travel - first to my students, and now to nearly a hundred teachers from all over California!*



## VI. NEWSLETTER: THE GENETIC PROBE

The *Genetic Probe Newsletter* was initiated in Fall 1993 by two teachers (B Neureither and J Bealer) as a vehicle for the exchange of ideas among the participants, other educators, and other professionals. Newsletter information helps update teachers on the new developments in human genetics, the HGP and ELSI. To date, 4 issues have been sent to workshop participants and other science teachers interested in human genetics (See Appendix K). The newsletter focuses on human genetics and ELSI issues not available in other national newsletters, thus complementing the efforts of newsletters such as *Genetics Digest*, *Gene Pool*, *Genetic Engineering News*, *Genome*, and *Human Genome News*.

The *Genetic Probe* is a forum to learn ways of obtaining inexpensive laboratory equipment, free publications, and other reference materials. It informs readers of national, regional and local meetings, workshops and speaker series. Participants share peer teaching experiences and solicit input into curriculum development and other teaching ideas. It also enables participants to be notified of other national programs, such as, for example, the *Access Excellence* program through Genentech, Inc., the MCET Telecourse on the *Human Genome Project: Exploring the Scientific Humanistic Dimensions*, from Boston, and the Genome issue of *Science* magazine. With increasing numbers of teachers with access to the Internet, future newsletters will be sent via the Internet and be accessible online.

## VII. GENETIC RESOURCE GUIDE

To personalize genetic conditions and integrate them into teachers' curriculum, *Genetic Conditions: Family Stories*, a resource guide, was further developed. The guide contains personal stories / vignettes and photographic slides of individuals or family members with genetic conditions. It is envisioned as a guide to supplement teaching. Stories were requested locally, regionally, and nationally from members of the Alliance for Genetic Support Groups or other genetic support groups. During the 1994 workshop, teachers reviewed a draft form of the guide and found the personal stories extremely helpful in capturing their students' interest in the science of genetics. One teacher stated: "Excellent idea to have 'normal' family pictures. Students can relate to real people and better understand the variation within disorders."

The guide will sensitize educators and students to the broad spectrum of genetic conditions which affect families. It shows the common, everyday life experiences, as well as the differences in the lives of families who deal with genetic conditions. Teachers see and present information about individuals with genetic conditions as members of families with children, siblings, parents, cousins; not just a "disease is a book".

Because of the sensitive nature of these stories, a *Family Stories* consent form and letter to support group members were reviewed by a university attorney familiar with HGP / ELSI issues. A letter describing the resource guide was sent to national support groups who in turn distributed an information letter about the project and a consent form to families. Stories from families who have completed the consent form are being compiled in a database and edited to include in the resource guide. More than 35 stories have been received to date. All are being edited and slides are being made of family portraits and karyotyping slides of conditions represented. (See Resource Guide Information Letters and Consent Form in Appendix J)

## VIII. EVALUATION

The project is being evaluated in terms of its content, concepts and organization, its ability to increase teachers' knowledge about HGP / ELSI topics, How the workshop enables teachers to transfer that knowledge to their students, and how students increase their knowledge of human genetics and ELSI issues.

### **WORKSHOP EVALUATION**

Participants were asked to list new concepts and ideas they learned as well as their comments about the session for each speaker, lab tour, panel or laboratory activity each day of the workshop week. These comments and pre and post survey information enable the workshop coordinator to access the efficiency and impact of the workshop and enable the planning committee to access content to plan future workshops.

### **TEACHER EVALUATION**

During the workshop in June 1994, a pre-survey and post-survey were administered to the 31 new participants attending Phase I of the project, and a post-survey was administered to the 56 participants returning for Phase III of the project. This survey enabled evaluation of the effectiveness of the workshop to teach new concepts and increase comfort levels in teaching human genetics.

### **STUDENT EVALUATION**

In January 1994, a post-survey was sent to the 78 participants of the 1993 workshop to complete the assessment of change in student knowledge. Participants administered the post-survey to the same class tested in September 1993. A post-survey was also sent to be administered to a sensitivity group: a different class not tested in September 1993.

The same post-survey was also sent to 14 control group teachers who had received the pre-survey in September 1993. Teachers administered the post-survey to one class of approximately 30 biology students as well as to a sensitivity class not previously surveyed.

In May and June 1994, a second student post-survey was administered to students of the 1993 workshop participants and to the control group to access the effect of the second workshop on the teaching style and content of workshop participants.

During the summer of 1994, the student survey was reviewed and re-worked.

In September 1994, a pre-survey was sent to new participants of the 1994 workshop to initiate a second round of evaluation of student knowledge.

A post-survey was sent in December 1994. Results will follow analysis of that data.

### **DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## APPENDICES

Appendix A	Workshop Agenda
Appendix B	Presenters List
Appendix C	Family Panel Comments by Participants
Appendix D	Laboratory Tour Descriptions
Appendix E	Genetics Educational Resource Materials
Appendix F	Teacher Presentations, Lesson Plans and Teaching Ideas
Appendix G	Mentors: Genetic Resource Specialists
Appendix H	Collaborations Between Mentors and Participants
Appendix I	Dissemination and Networking
Appendix J	Family Stories Information and Consent Letters
Appendix K	The Genetic Probe Newsletters

# HUMAN GENOME PROJECT: GENETICS EDUCATION WORKSHOP

## FOR MIDDLE AND SECONDARY SCIENCE TEACHERS

### KANSAS CITY, JUNE 20 - 25, 1994

The Quarterage Hotel  
560 Westport Road, Kansas City, MO  
(816) 931-0001

MONDAY, JUNE 20, 1994	
	<p style="text-align: center;"><b>THINGS TO DO AROUND KANSAS CITY (FOR EARLY ARRIVALS):</b></p> <ul style="list-style-type: none"> <li>• The Steamship Arabia Museum in the River Market District via the Trolley</li> <li>• Tour Midtown Kansas City on the K.C. Trolley. Trolley stops in front of Californos Restaurant, (turn left from Hotel, walk up the hill 1.5 blocks to Pennsylvania, turn right, 1 block down.)</li> <li>• The Country Club Plaza Shopping Center (walk east 2.5 blocks to Broadway, turn right, 7 blocks south)</li> <li>• Crown Center Shops via the Trolley (24th and Main Streets)</li> <li>• Loose Park (south of the Plaza at 54th and Wornall Road)</li> <li>• Westport Shops (1 block east)</li> <li>• Vietnam Memorial (east on Westport Road to Broadway, turn right, 2 blocks south)</li> <li>• World War I Liberty Memorial and Museum via the Trolley (west of Crown Center, 25th and Main Street)</li> <li>• Manor Square of Westport: The Tivoli movie theater, shops (1 block east)</li> </ul> <p><i>Note: More information about recreational activities is available in the Plaza and Westport Guides, Kansas City Star's FYI section, and Events in Kansas City page in Resource Room</i></p>
4:00	<b>REGISTRATION IN THE HOTEL LOBBY</b>
5:00 to 7:00	<p><b>RECEPTION AND INTRODUCTION</b></p> <p>Westport Room and Hotel Lounge</p>

TUESDAY, JUNE 21, 1994: DAY 1			LARGE DOT
8:00	WELCOME, INTRODUCTION AND LATE REGISTRATION Stanfords  RED, YELLOW, BLUE, GREEN		
8:30	<i>Probability Exercise</i> Linda Segebrecht, M.S. Stanfords RED, YELLOW	<i>Participant Pre-Survey</i> Westport Room  BLUE, GREEN	
9:00	<i>Genetic Conditions and the Gene Pool</i> Laura Mitchell, Ph.D. Stanfords RED, YELLOW	<i>BSCS Activity 1: DNA Sequencing</i> <i>BSCS Activity 2: Do Our Genes Determine Our Future?</i> Becky Knetter, M.S.  Westport Room  BLUE, GREEN	
10:00	Discussion	 Westport Room  BLUE, GREEN	
10:30	Shuttle to KUMC		
11:00	<i>Ethics Curriculum Development Discussion</i> Gordon Mendenhall, Ph.D. and Helen Griech, M.S. Wahl Hall East, KUMC  RED, YELLOW	<i>Genetic Conditions and the Gene Pool</i> Laura Mitchell, Ph.D. Stanfords  BLUE, GREEN	
12:00		Discussion	
12:30		Shuttle to KUMC	
12:45	LUNCH KUMC, Stoland Lounge or Outside Patio	LUNCH KUMC, Stoland Lounge or Outside Patio	
1:15	<i>Legal Issues and the Human Genome Project: Teleconference from Boston</i> Phillip Reilly, M.D., J.D. Wahl Hall West Auditorium, KUMC  RED, YELLOW, BLUE, GREEN		
2:30	Discussion		
3:00	Break		
3:15	<i>Internet Access and the Information Highway</i> David Voran, M.D. Wahl Hall West Auditorium, KUMC  RED, YELLOW	<i>Impact of the HGP on Medical Genetics</i> R. Neil Schimke, M.D. 1023 Orr-Major, KUMC  BLUE, GREEN	
4:30	3 Shuttles to Quarterage approximately 20 minutes apart		
6:00	DINNER at Tenampa Taqueria (Meet in the Hotel Lobby to load bus)		
7:30	<i>Teacher Presentations</i> 38•S. Zupo•7:00      37•P. Wolkow•7:15 35•D. Tatge•7:30      32•C. Smith•7:45 28•H. Nolen•8:00      24•S. Morris•8:15 21•S. Mensing•8:30    12•A. Johnson•8:45 10•M. Hess•9:00      7•B. Garrison•9:15  Westport Room	<i>Winding Your Way Through DNA</i> <i>Decoding the Book of Life</i> videotapes  McCoy Room	
8:30		<i>Predictive Testing for Huntington Disease</i> <i>Cleft Lip and Palate</i> videotapes  McCoy Room	

WEDNESDAY, JUNE 22, 1994: DAY 2				SMALL DOT
	LIGHT BLUE	YELLOW	GREEN	
8:00	Shuttle to KUMC			
8:30	HGP Information Management, Access and Regulation Joseph McInerney, M.S. 4015 Orr-Major, KUMC		LT BLUE, YELLOW, GREEN	
9:45	Shuttle to the Quarterage			
10:00	Public Policy Issues and the HGP Rebecca Anderson, M.S., J.D. Stanfords		RED, BLACK, LT BLUE, YELLOW, GREEN	
11:00	Discussion			
11:30	LUNCH			
12:30	Shuttle	Shuttle	Prenatal Diagnosis, Screening and Teratogens Lenna Levitch, M.S. McCoy Room PINK, GREEN	
1:00	Drosophila Research Lab Tour (Fecht), KUMC 229 Smith East LT BLUE	Regional Crime Lab Tour 1525 Holmes YELLOW	Materials Review Boone Resource Room GREEN	
1:30				
2:00	Shuttle	Shuttle	Shuttle	
2:30	Family Panel: Huntington Disease Caroline Gray, R.N., Moderator Westport Room LT BLUE PINK, DK BLUE, BLACK	Cytogenetic Lab Tour, KUMC 1405 Bell	YELLOW, GREEN	
3:30	Teacher Talks 5 • L. Davis • 3:30 4 • L. Davis • 3:45 15 • B. Limes • 3:55 33 • C. Smith • 4:25 39 • S. Zupo • 4:45 McCoy Room DK BLUE, LT BLUE	Shuttle		
4:00		Family Panel: Huntington Disease Caroline Gray, R.N., Moderator Westport Room	RED, YELLOW, GREEN	
5:00	BREAK			
6:00	DINNER at Torre's Pizzeria			
7:30	Facial Disfigurement Spina Bifida videotapes Westport Room	CSHL Laboratory Techniques videotapes McCoy Room		
8:30	NF Cystic Fibrosis videotapes Westport Room	MCET Teleconference Series videotapes McCoy Room		

WEDNESDAY, JUNE 22, 1994: DAY 2

SMALL DOT

	PURPLE	PINK
8:00	<i>Public Policy Issues and the HGP</i> Rebecca Anderson, M.S., J.D. Stanfords ORANGE, DK BLUE, PURPLE, PINK	
9:00	Discussion	
9:30	Shuttle	
9:45	<i>HGP Information Management, Access and Regulation</i> Joseph McInerney, M.S. 4015 Orr-Major, KUMC PURPLE, PINK	
11:00	Shuttle	
11:30	LUNCH	
12:30	Shuttle	<i>Prenatal Diagnosis, Screening and Teratogens</i> Lenna Levitch, M.S. McCoy Room GREEN, PINK
1:00	<i>Johnson County Crime Lab Tour</i> 600 Lamar PURPLE	<i>Obtaining A Family History</i> Debra L. Collins, M.S. McCoy Room PINK
1:30		
2:00	Shuttle	
2:30	<i>Midwest Organ Bank Lab Tour</i> 1900 W 47 <sup>th</sup> PURPLE	<i>Family Panel: Huntington Disease</i> Caroline Gray, R.N., Moderator Westport Room LT BLUE, DK BLUE, BLACK, PINK
3:30	Shuttle	Shuttle
4:00	<i>Biochemistry Lab Tour, KUMC</i> 4022 Wahl Hall East PURPLE	<i>Cross Clinical Lab Tour</i> 3433 Rainbow Ext BLACK, PINK
5:00	Shuttle	Shuttle
6:00	DINNER at Torre's Pizzeria	
7:30	<i>Facial Disfigurement</i> <i>Spina Bifida</i> videotapes Westport Room	<i>CSHL Laboratory Techniques</i> videotapes McCoy Room
8:30	<i>NF</i> <i>Cystic Fibrosis</i> videotapes Westport Room	<i>MCET Teleconference Series</i> videotapes McCoy Room

WEDNESDAY, JUNE 22, 1994: DAY 2			SMALL DOT
	ORANGE	DARK BLUE	
8:00	Public Policy Issues and the HGP Rebecca Anderson, M.S., J.D. Stanfords  PURPLE, PINK, ORANGE, DK BLUE		
9:00	Discussion		
9:30	Teacher Talks 25 • S. Morris • 9:30 8 • D. Glenn • 9:40 31 • G. Slaybaugh • 9:55 18 • J. McCain • 10:10 9 • L. Hays • 10:20 1 • M. Bartlett • 10:35 23 • D. Miller • 10:45 16 • C. MacMullan • 10:55 Westport Room  ORANGE, DK BLUE		
11:15	Snack on Shuttle		
11:30	HGP Information Management, Access and Regulation Joseph McInerney, M.S. 4015 Orr-Major, KUMC  ORANGE, DK BLUE		
12:45	Shuttle		
1:00	LUNCH		
2:15	Shuttle	Break	
2:30	Cross Clinical Lab Tour 3433 Rainbow Ext  ORANGE	Family Panel: Huntington Disease Caroline Gray, R.N., Moderator Westport Room LT BLUE, BLACK, PINK, DK BLUE	
3:30	Shuttle	Teacher Talks 5 • L. Davis • 3:30 4 • L. Davis • 3:45 15 • B. Limes • 3:55 33 • C. Smith • 4:25 39 • S. Zupo • 4:45 McCoy Room LT BLUE, DK BLUE	
4:00	Cytogenetic Lab Tour, Children's Mercy Lab Tour 2801 Wyandotte  ORANGE		
5:00	Shuttle	BREAK	
6:00	DINNER at Torre's Pizzeria		
7:30	Facial Disfigurement Spina Bifida videotapes  Westport Room	CSHL Laboratory Techniques  videotapes McCoy Room	
8:30	NF Cystic Fibrosis videotapes  Westport Room	MCET Teleconference Series  videotapes McCoy Room	
WEDNESDAY, JUNE 22, 1994: DAY 2			
SMALL DOT			



	RED	BLACK
8:30	<i>Family Panel</i> Lenna Levitch, M.S., Moderator Westport Room RED, BLACK	
9:30	BREAK	
10:00	<i>Public Policy Issues and the HGP</i> Rebecca Anderson, M.S., J.D. Stanfords LT BLUE, YELLOW, GREEN, RED, BLACK	
11:00	Discussion	
11:30	LUNCH	
12:30	Shuttle	
1:00	<i>HGP Information Management, Access and Regulation</i> Joseph McInerney, M.S. 4015 Orr-Major, KUMC RED, BLACK	
2:15	Shuttle	Shuttle
2:30	<i>Johnson County Crime Lab Tour</i> 6000 Lamar RED	<i>Family Panel: Huntington Disease</i> Caroline Gray, R.N., Moderator Westport Room PINK, LT BLUE, DK BLUE, BLACK
3:30	Shuttle	Shuttle
4:00	<i>Family Panel: Huntington Disease</i> Caroline Gray, R.N., Moderator Westport Room YELLOW, GREEN, RED	<i>Cross Clinical Lab Tour</i> 3433 Rainbow Ext PINK, BLACK
5:00	BREAK	Shuttle
6:00	DINNER at Torre's Pizzeria	
7:30	<i>Facial Disfigurement</i> <i>Spina Bifida</i> videotapes Westport Room	<i>CSHL Laboratory Techniques</i> videotapes McCoy Room
8:30	<i>NF</i> <i>Cystic Fibrosis</i> videotapes Westport Room	<i>MCET Teleconference Series</i> videotapes McCoy Room

THURSDAY, JUNE 23, 1994: DAY 3				SMALL DOT
	LIGHT BLUE	YELLOW	GREEN	
8:30	Genetic Counseling Diane Baker, M.S. McCoy Room LT BLUE, YELLOW		Family Panel Jill Rogers, M.S., Moderator Westport Room RED, GREEN	
9:30	Break		break	
10:00	Technology Education and the HGP Paula Gregory, Ph.D. Stanfords RED, BLACK, LT BLUE, YELLOW, GREEN			
11:00	Discussion			
11:30	LUNCH			
12:30	Teacher Talks 14 • J. LaFerriere • 12:30 19 • M. McCurdy • 12:50 26 • B. Neureither • 1:15 34 • S. Talkmitt • 1:45 McCoy Room LT BLUE, YELLOW		Shuttle	
1:00			Regional Crime Lab Tour 1525 Holmes GREEN	
2:00	Break		Shuttle	
2:30	Family Panel Diane Baker, M.S., Moderator Westport Room DK BLUE, BLACK, LT BLUE, YELLOW		Genetic Counseling Michael Begleiter, M.S. Hotel Lounge PURPLE, GREEN	
3:00				
3:30	Shuttle		Teacher Talks 2 • J. Bealer • 3:30 29 • B. Schmidt • 4:00 30 • B. Silber • 4:10 6 • S. Dominic • 4:20 22 • B. Miller • 4:30 Hotel Lounge PINK, BLACK, GREEN	
4:00	Biochemistry Lab Tour, KUMC 4022 Wahl Hall East LT BLUE, YELLOW			
5:00	Shuttle		Break	
6:00	DINNER at the Westport Flea Market Restaurant			
7:00	Prenatal Diagnosis Cancer videotapes Westport Room	MCET Teleconference Series videotape McCoy Room		
8:00	Ehlers Danlos Syndrome videotapes Westport Room	Human Genome Project videotape McCoy Room		

THURSDAY, JUNE 23, 1994: DAY 3			SMALL DOT
	PURPLE	PINK	
8:00	<i>Technology Education and the HGP</i> Paula Gregory, Ph.D. Stanfords  ORANGE, PURPLE	Shuttle	
8:30		<i>Cytogenetics Lab Tour, Children's Mercy</i> 2801 Wyandotte  DK BLUE, PINK	
9:30			
9:45	Shuttle	Shuttle	
10:00	<i>Cytogenetics Lab Tour, KUMC</i> 1405 Bell  PURPLE	<i>Technology Education and the HGP</i> Paula Gregory, Ph.D. Stanfords RED, BLACK, DK BLUE, PINK	
11:00	Shuttle	Discussion	
11:30	LUNCH		
12:30	<i>Family Panel</i> Jill Rogers, M.S., moderator Westport Room  ORANGE, PURPLE, PINK		
1:30	<i>Teacher Talks</i> 17 • E. Mayo • 1:30 11 • F. Jahn • 2:00 20 • A. McDonald • 2:15 Stanfords  RED, PURPLE	Shuttle	
2:00		<i>Molecular Genetics Lab Tour,</i> <i>Children's Mercy</i> 2801 Wyandotte  PINK	
2:30	<i>Genetic Counseling</i> Michael Begleiter, M.S. Hotel Lounge  GREEN, PURPLE		
3:00		Shuttle	
3:30	<i>Politics and DNA</i> Diane Baker, M.S. Westport Room  ORANGE, PURPLE	<i>Teacher Talks</i> 2 • J. Bealer • 3:30 29 • B. Schmidt • 4:00 30 • B. Silber • 4:10 6 • S. Dominic • 4:20 22 • B. Miller • 4:30	
4:30		Hotel Lounge GREEN, BLACK, PINK	
5:00	BREAK		
6:00	DINNER at the Westport Flea Market		
7:00	<i>Prenatal Diagnosis</i> Cancer videotapes Westport Room	<i>MCET Teleconference Series</i> videotape McCoy Room	
8:00	<i>Ehlers Danlos Syndrome</i> videotapes Westport Room	<i>Human Genome Project</i> videotape McCoy Room	

THURSDAY, JUNE 23, 1994: DAY 3			SMALL DOT
	ORANGE	DARK BLUE	
8:00	<i>Technology Education and the HGP</i> Paula Gregory, Ph.D. Stanfords PURPLE, ORANGE	Shuttle	
8:30		<i>Cytogenetics Lab Tour, Children's Mercy</i> 2801 Wyandotte PINK, DK BLUE	
9:00	Discussion		
9:30	Shuttle	Shuttle	
10:00	<i>Molecular Genetics Lab Tour, Children's Mercy</i> 2801 Wyandotte ORANGE	<i>Technology Education and the HGP</i> Paula Gregory, Ph.D. Stanfords RED, BLACK, PINK, DK BLUE	
11:00	Shuttle	Discussion	
11:30	LUNCH		
12:15		Shuttle	
12:30	<i>Family Panel</i> Jill Rogers, M.S., Moderator Westport Room PURPLE, ORANGE	Break	
1:00		<i>Drosophila Lab Tour (Fechtel), KUMC</i> 229 Smith East DK BLUE	
1:30	Shuttle		
2:00	<i>Materials Review</i> Boone Resource Room ORANGE	shuttle	
2:15			
2:30	<i>Preconception Genetic Counseling</i> Jill Rogers, M.S. McCoy Room RED, ORANGE	<i>Family Panel</i> Diane Baker, M.S., Moderator Westport Room BLACK, LT BLUE, DK BLUE	
3:15			
3:30	<i>Politics and DNA</i> Diane Baker, M.S. Westport Room PURPLE, ORANGE	<i>Materials Review</i> Boone Resource Room	
4:30	Discussion	<i>Genetic Counseling &amp; Prenatal Diagnosis</i> Michael Begleiter, M.S. McCoy Room BLACK, DK BLUE	
5:00	BREAK		
6:00	DINNER at the Westport Flea Market Restaurant		
7:00	<i>Prenatal Diagnosis</i> <i>Cancer</i> videotapes Westport Room	<i>MCET Teleconference Series</i> videotape McCoy Room	
8:00	<i>Ehlers Danlos Syndrome</i> videotapes Westport Room	<i>Human Genome Project</i> videotape McCoy Room	

THURSDAY, JUNE 23, 1994: DAY 3			SMALL DOT
	RED	BLACK	
8:00		Shuttle	
8:30	<i>Family Panel</i> Jill Rogers, M.S., Moderator Westport LT BLUE, GREEN, RED	<i>Regional Crime Lab Forensic</i> 1525 Holmes BLACK	
9:30	Discussion	Shuttle	
10:00	<i>Technology Education and the HGP</i> Paula Gregory, Ph.D. Stanfords DK BLUE, PINK, RED, BLACK		
11:00	Discussion		
11:30	LUNCH		
12:15		Shuttle	
12:30	<i>Teacher Talks</i> 3 • B. Cefalo • 12:30 13 • S. Koba • 12:40 27 • H. Nolen • 12:55 36 • P. Wolkow • 1:15 Stanfords RED	<i>Drosophila Lab Tour (Osterbur), KUMC</i> 229 Smith East BLACK	
1:30	<i>Teacher Talks</i> 17 • E. Mayo • 1:30 11 • F. Jahn • 2:00	Shuttle	
2:00	20 • A. McDonald • 2:15 Stanfords PURPLE, RED	Break	
2:30	<i>Preconception Genetic Counseling</i> Jill Rogers, M.S. McCoy Room DK BLUE, RED	<i>Family Panel</i> Diane Baker, M.S., Moderator Westport Room DK BLUE, LT BLUE, YELLOW, BLACK	
3:30	Shuttle	<i>Teacher Talks</i> 2 • J. Bealer • 3:30 29 • B. Schmidt • 4:00 30 • B. Silber • 4:10 6 • S. Dominic • 4:20 22 • B. Miller • 4:30 Hotel Lounge GREEN, PINK, BLACK	
4:00	<i>Cytogenetics Lab Tour</i> <i>Children's Mercy</i> 2801 Wyandotte RED	<i>Genetic Counseling and Prenatal Diagnosis</i> Michael Begleiter, M.S. McCoy Room DK BLUE, BLACK	
4:30			
5:00	Shuttle	Break	
6:00	DINNER at the Westport Flea Market		
7:00	<i>Prenatal Diagnosis; Cancer</i> videotapes Westport Room	<i>MCET Teleconference Series</i> videotape McCoy Room	
8:00	<i>Ehlers Danlos Syndrome</i> videotapes Westport Room	<i>Human Genome Project</i> videotape McCoy Room	

FRIDAY, JUNE 24, 1994: DAY 4						SMALL DOT
LT BLUE	BLACK	DK BLUE	GREEN	YELLOW	PINK	RED
8:30	<i>Clinical Application of Human Genome Technology</i> R. Neil Schimke, M.D. Stanfords <div>LT BLUE, BLACK, DK BLUE, GREEN, YELLOW, PINK, RED</div>					
9:30	Discussion		Discussion			
9:45	Shuttle					
10:00	<i>Cytogenetics Lab Tour, Children's Mercy 2801 Wyandotte</i> LT BLUE, BLACK	<i>Biotechnology Support Lab Tour, KUMC 1018/19 Orr-Major</i> RED	<i>Genetic Counseling</i> Debra L. Collins, M.S. Westport Room <div>DK BLUE, GREEN, YELLOW, PINK</div>			
11:00	Shuttle to KUMC	Walk to Murphy	LUNCH at Quarterage			
11:15	LUNCH in Murphy					
11:45			Shuttle to KUMC			
12:00	<i>The Human Genome Project: Implications for the Future - Technology</i> Francis Collins, M.D., Ph.D. Battenfeld Auditorium, KUMC <div>ALL</div>					
1:00	DISCUSSION					
1:30	BREAK					
2:00	<i>The Human Genome Project: Implications for the Future - Education</i> Francis Collins, M.D., Ph.D. Battenfeld Auditorium, KUMC <div>ALL</div>					
3:00	DISCUSSION					
3:30	BREAK					
4:00	1st Shuttle from Battenfeld to The Quarterage					
4:20	2nd Shuttle from Battenfeld to The Quarterage					
4:30	SMALL GROUP DIALOGUE AND DISCUSSION					
	Ethics Curriculum Spanish Curriculum Biotechnology & Laboratory Curriculum Computer Technology Integration for the Classroom Human Genetics Educational Materials Review Grant Writing and Funds Acquisition				Locations to be announced	
6:30	Arthur Bryant's Barbecue Dinner, The Quarterage Hotel (Outside) for Participants, Speakers and Lab Personnel					

FRIDAY, JUNE 24, 1994: DAY 4			SMALL DOT
	ORANGE	PURPLE	
8:30	<i>Family Panel</i> Debra Collins, M.S., Moderator Westport Room		ORANGE, PURPLE
9:30	Shuttle to KUMC		
9:45	<i>Internet Access and the Information Highway</i> David Voran, M.D. Clendenning Auditorium, 2nd Floor Robinson, KUMC		ORANGE, PURPLE
11:15	Walk to Murphy		
11:30	LUNCH at Murphy		
12:00	<i>The Human Genome Project: Implications for the Future - Technology</i> Francis Collins, M.D., Ph.D. Battenfeld Auditorium, KUMC		ALL
1:00	DISCUSSION		
1:30	BREAK		
2:00	<i>The Human Genome Project: Implications for the Future - Education</i> Francis Collins, M.D., Ph.D. Battenfeld Auditorium, KUMC		ALL
3:00	DISCUSSION		
3:30	BREAK		
4:00	1st Shuttle from Battenfeld to The Quarterage		
4:15	2nd Shuttle from Battenfeld to The Quarterage		
4:30	SMALL GROUP DIALOGUE AND DISCUSSION		
	Ethics Curriculum Spanish Curriculum Biotechnology & Laboratory Curriculum Computer Technology Integration for the Classroom Human Genetics Educational Materials Review Grant Writing and Funds Acquisition	Locations to be announced	
6:30	Arthur Bryant's Barbecue Picnic Dinner at the Quarterage Hotel (Outside) for Participants, Speakers and Lab Personnel		

SATURDAY, JUNE 25, 1994: DAY 5				large dot
8:30	<i>BSCS Activity 3: The Case of Nathaniel Wu</i> Becky Knetter, M.A.  Stanfords  BLUE, GREEN	<i>Peer Teaching Discussion</i> Gene Hampton, Ed.D.  McCoy Room  RED	<i>Peer Teaching: Science and Ethics</i> Gordon Mendenhall, Ed.D. Westport Room  YELLOW	
9:30	Discussion	Discussion	Discussion	
10:00	<i>BSCS Activity 4: Public Policy: Genetics and Alcoholism</i> Becky Knetter, M.A. Stanfords  BLUE, GREEN	<i>Peer Teaching about Science and Ethics</i> Gordon Mendenhall, Ed.D. McCoy Room  RED	<i>Peer Teaching Ideas</i> Gene Hampton, Ed.D.  Westport Room  YELLOW	
11:00	Discussion	Discussion	Discussion	
11:30	LUNCH			
12:30	<i>Family Panel</i> Debra L. Collins, M.S., Moderator  Westport Room  BLUE, GREEN	<i>Curriculum Development Session</i> Bill Humphries, M.S. Leo Palmero, M.S. Stanfords  RED, YELLOW		
1:30	BREAK	BREAK		
2:00	<i>Curriculum Development Session</i> Bill Humphries, M.S. Leo Palmero, M.S. Westport Room  BLUE, GREEN	<i>Genetic Counseling Activity</i> Debra L. Collins, M.S.  Stanfords  RED, YELLOW		
3:00	REVIEW OF PHASES 2, 3 AND 4 OF THE PROJECT Debra Collins, M.S. & Linda Segebrecht, M.S.  STANFORDS  ALL			
3:30	PARTICIPANT POST-SURVEY Debra Collins, M.S. & Linda Segebrecht, M.S.  STANFORDS  ALL			
4:00	DRAWING FOR PRIZES ADJOURNMENT  STANFORDS  ALL			



**PRESENTER LIST**  
**HUMAN GENOME PROJECT WORKSHOP:**  
***GENETICS EDUCATION FOR MIDDLE AND SECONDARY SCIENCE TEACHERS***  
**KANSAS CITY, JUNE 20 - 25, 1994**

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## **FAMILY PANELS**

### **Comments by Participants, 1994 Workshop**

#### **CRI-DU-CHAT, OCULAR ALBINISM**

- Heartbreaker. Kent was an effective speaker, brought tears to my eyes.
- Heartbreaking. What a brave man to be able to talk about his family in public.
- Wonderful. Gave the parent's view and the mixed emotions of loving a handicapped child.
- Wow! Very moving experience, excellent to hear about these rare syndromes and the human impact.

#### **DOWN SYNDROME, ICHTHYOSIS AND NEUROFIBROMATOSIS**

- Did not know anything about ichthyosis before.
- Very interesting, I always get a lot out of family panels.
- First hand account of living with a child with ichthyosis.
- Excellent.
- I had not heard of ichthyosis before. Very interesting.
- Terrific.
- I was uninformed about ichthyosis, this was valuable. I continue to be impressed with the "parents as experts" on these conditions.
- We need to stress to our students that these children are more "normal" than "abnormal".
- The importance of family support groups rather than doctors for spreading current information.
- It is so helpful to see and talk with people who know these problems first hand.
- Characteristics, chances.
- Sensitivity.
- I applaud their ability to address us and talk with us. Wonderful!

#### **DWARFISM, DYSTONIA / RETINITIS PIGMENTOSA**

- Difficult to experience.
- Excellent, heartwarming to actually meet people and families coping with these diseases we've been learning about.
- Joy Wyler was particularly informative.
- Thought provoking. An excellent presentation.
- Wonderful chance to meet people living with "handicaps" and hear their perspective.
- 100 different types of dwarfism.
- I greatly admire these families.
- Family panels put a humanistic element into the study of genetics.
- Genetic diseases from the patient's point of view.
- Enlightening.
- I learned that there are many sources of dwarfism. But mostly the panel helped me in understanding the human dimension of all of the conditions.
- Inspirational. Humanistic aspect needed after labs, computers, and talks.
- The human aspects, real issues that people have to deal with, brought into a genetic aspect.
- It is difficult to accept that families' needs are not met: additional health care should be given.
- The importance of self identity.
- the most moving experience so far. Learned more about human nature than genetics.
- Very valuable and memorable.
- Good opportunity.
- Very informative to see individuals who have some of these disorders. It is a refreshing and positive experience.
- Fantastic! Have more of these to give the human dimension to back statistics.

#### **HUNTINGTON DISEASE PANEL**

- I cannot believe the strength of the people. I have so much empathy for them. Good and interesting.
- These panels are great. They provide an experience teachers cannot get easily in any other way.
- Wow! Another great presentation.
- A lot of new information.
- Great!
- All individuals with HD have different manifestations of the condition.
- Panels are the best part of the workshop: so relevant and touching.
- Characteristics, chances and lifestyle decisions.
- Doctors need to be aware of people's feelings.
- Family attitudes.
- Excellent.
- First hand exposure to individuals with the condition.
- HD diversity of symptoms.
- Fascinating!
- Honest and informative. I was surprised how much variation in HD there is.
- Excellent.
- How family members deal with HD.
- How it feels to be tested and make choices about children.
- Fantastic.
- Human viewpoint. Useful for HGP modules.
- Excellent
- I learned that it can express itself in a mild way as well as acutely.
- Insight into the family with Huntington disease.
- This is so good for us. Most beneficial.
- Interesting to get the "real life" information.
- Good!
- I learned some of the symptoms of HD.
- Patients and their families presented the "human" side of this scientific disease.
- A very humbling experience.
- Reinforcement of the valuable role (support) of genetic counselors.
- Excellent and informative.
- Sensitiveness is necessary in the classroom.
- The question remains in my mind that many of these people knew HD ran in their family and still had families of their own. Why?
- The range in degree of expression was new to me. Also the cases of early onset (juvenile and younger).
- Excellent.
- The themes that I felt were important: the need of understanding and support on the part of the community. I got the feeling that these people were very alone. They have support groups but only over long distances.
- The wide range of ages for onset.
- Very powerful panel.
- This was the first person I'd seen with Huntington disease.
- Very good.
- Two year old who had the symptoms.
- Very eye-opening.
- Moving and amazing stories.
- We must as teachers be more sensitive to any possible gene condition that may be out there among our students.
- Good panel.

## **PROTEUS SYNDROME AND SHORT STATURE**

- I can't keep from being too emotional.
- Interesting.
- Discussion on variations in genetic anomalies.
- Excellent.
- Excellent comments about self-worth, discrimination, quality of life decisions.
- Joy really made me think about looking at these social issues. I look forward to incorporating it into my middle school curriculum.
- Family panels remind me that a defect does not necessary mean mental deficiency.
- Good panel group. I saw Alex last year and could see a real improvement in his personality. It was good to see him in a family setting.
- These are outstanding. They give is a totally new view of human genetic conditions. This is the best part of the week.

## **RUBENSTEIN-TABI, CORNELIA DE LANGE, EHLERS-DANLOS SYNDROME**

- These panels are exceptional experiences.
- Very informative.
- Best way to learn about these syndromes.
- Great!
- Didn't know about Ehlers-Danlos problems with diagnosis: how one syndrome blends with another.
- Excellent. Bravo to these people. Wonderful.
- Great background information on genetic diseases. Gained insight.
- Very good!
- Nothing has opened my eyes more than the family panels. To actually talk directly to the patients and families really puts the truth right in front of you!
- The difficulty in diagnosing conditions when there is no gene marker.
- Two of the syndromes I had never heard of.
- Fascinating.

## **SHORT STATURE AND DYSTONIA**

- Always one of the best parts of the workshop.
- Excellent.
- Excellent.
- Shows the real life people who live with these conditions.
- Good!
- This is the first time I had ever seen or heard about dystonia. Seeing before my eyes the three brothers shows the impact of dominance in a gene.
- Joy gave a lot of information about handling handicaps in the classroom. This was fantastic. I wish we'd had more time.

## LABORATORY TOUR DESCRIPTIONS

### HUMAN GENOME PROJECT WORKSHOP: GENETICS EDUCATION FOR MIDDLE AND SECONDARY SCIENCE TEACHERS KANSAS CITY, JUNE 20 - 25, 1994

#### **Clinical Labs:**

##### **MOLECULAR GENETICS LABORATORY • Paul Rothberg, Ph.D.**

Children's Mercy Hospital, Kansas City, MO

*DNA clinical based testing for cystic fibrosis and Duchenne muscular dystrophy, controlled gene expression in cancer research.*

##### **CROSS CLINICAL LABORATORY • Donald Cross, M.D. and Michael Anthes**

Kansas City, KS

*Histocompatibility, DNA and paternity testing, bone marrow transplant information and organ transplantations.*

##### **MIDWEST ORGAN BANK • Karen Baier**

Kansas City, KS

*Histocompatibility and DNA testing for organ procurement [flow cytometer and polymerase chain reaction (PCR) amplification techniques demonstrated].*

#### **Cytogenetic Labs:**

##### **CYTOGENETICS LABORATORY • Terry Arthur, B.S.**

University of Kansas Medical Center, Kansas City, KS

*Karyotyping explanation/demonstration (displaying variety of normal and aneuploid karyotypes), computer karyotype system explained, karyotypes from amniocentesis, chorionic villi sampling, and tumors displayed.*

##### **CYTOGENETICS LABORATORY • Linda Pasztor, Ph.D.**

Children's Mercy Hospital, Kansas City, MO

*Karyotyping, demonstration of florescent in-situ hybridization (FISH) technology and probes.*

#### **Forensic Labs:**

##### **JOHNSON COUNTY CRIME LABORATORY • Gary Dirks**

Mission, KS

*DNA forensic analysis laboratory using polymerase chain reaction (PCR) technology for local law enforcement, on-line automated fingerprint identification system.*

##### **MISSOURI POLICE DEPARTMENT REGIONAL CRIMINOLOGY LABORATORY • John Wilson**

Kansas City, MO

*DNA forensic lab using restriction fragment length polymorphism (RFLP) technology for regional crime investigation and explanation of autoradiography, FBI analysis using computer technology, restriction enzymes, probes and legal issues.*

## **Research Labs:**

### **BIOCHEMISTRY LABORATORY • Lynwood Yarbrough, Ph.D. and Jackie Tremblay**

University of Kansas Medical Center, Kansas City, KS

*DNA Data analysis, protein mapping and sequencing techniques, DNA research on stress proteins and aging, tubulin refolding.*

### **DROSOPHILA LABORATORY • Kim Fechtel, Ph.D. and David Osterbur, Ph.D.**

University of Kansas Medical Center, Kansas City, KS

*Drosophila research laboratory, DNA sequencing demonstrated.*

### **BIOTECHNOLOGY SUPPORT FACILITY • Satya Yadav, Ph.D.**

University of Kansas Medical Center, Kansas City, KS

*State of the art instrumentation of technology for oligonucleotide synthesis (including chromatography), protein synthesis analysis and degradation demonstrated.*

**GENETICS EDUCATIONAL RESOURCE MATERIALS**  
**September 8, 1994**

The following list of genetics education materials was compiled by the Genetics Education Center, University of Kansas Medical Center, Kansas City, KS 66160-7318. phone: (913)588-3886  
e-mail: geneduc@ukanvm.cc.ukans.edu

In general, it contains materials available since 1992 which may be helpful to teachers and other professionals to supplement their teaching curricula. The books, booklets, brochures, computer programs, curriculum, journals, hands-on materials, newsletters, and videotapes are part of an ongoing genetics education database project.

We welcome input and suggestions. See Suggestions Form at end of list.

This Genetics Education Resource List will be updated periodically.

BOOKS

- Andrews, Lori B., J.E. Fullarton, N.A. Holtzman, A.G. Motulsky, ASSESSING GENETIC RISKS, National Academy Press, 1994. ISBN:0-309-04798-6  
book subj: GENETIC TESTING  
grade(s): secondary, adult, professional
- Annas, George J., and Alias, Sherman, GENE MAPPING USING LAW AND ETHICS AS GUIDES, Oxford University Press, 1992. ISBN:0-19-507303-7  
book subj: LAW, ETHICS  
grade(s): secondary, adult
- Balkwill, Fran and Rolph, Mic, AMAZING SCHEMES WITHIN YOUR GENES, Cold Spring Harbor Laboratory Press Co., 1993. ISBN:0-00-196465-8  
book subj: BASIC GENETICS  
grade(s): elementary, middle
- Balkwill, Fran and Rolph, Mic, DNA IS HERE TO STAY, Cold Spring Harbor Laboratory Press Co., 1992. ISBN:0-00-191165-1  
book subj: BASIC GENETICS  
grade(s): elementary, middle
- Berg, Paul, and Singer, Maxine, DEALING WITH GENES: THE LANGUAGE OF HEREDITY, University Science Books, 1992. ISBN:0-935702-69-5  
book subj: GENERAL GENETIC  
grade(s): secondary, adult
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grade(s): professional

UNDERSTANDING SPINA BIFIDA, ACCESS Plan, 1993

videotape subj: SPINA BIFIDA

grade(s): secondary, adult, professional

Aase, Jon M., THE CLINICAL DIAGNOSIS OF FETAL ALCOHOL SYNDROME, Flora &  
Company, P.O. Box 8263, Albuquerque, NM 87198-8263, 1994

videotape subj: FETAL ALCOHOL SYNDROME

grade(s): professional

Blatt, Robin, EXPLORING THE SCIENTIFIC AND HUMANISTIC DIMENSIONS OF THE  
HGP (TEACHER), MCET, 38 Sidney Street, Cambridge, MA 02139, 1994

videotape subj: HGP

grade(s): secondary

CBS News, 60 MINUTES: "THE DECISION", Ambrose Video Publishing Company,  
P.O. Box 2054, S. Burlington, VT 05407, 1992.

videotape subj: MEDICAL GENETICS

grade(s): secondary, adult, professional

Cold Spring Harbor, WINDING YOUR WAY THROUGH DNA, 1 OF 6, Cold Spring Harbor Laboratory Press Co., Fulfillment Department, Plainview, NY 11803-2500, 1992  
videotape subj: DNA TECHNOLOGY  
grade(s): secondary, adult, professional

Cold Spring Harbor, WINDING YOUR WAY THROUGH DNA, 2 OF 6, Cold Spring Harbor Laboratory Press Co., Fulfillment Department, Plainview, NY 11803-2500, 1992  
videotape subj: DNA TECHNOLOGY  
grade(s): secondary, adult, professional

Cold Spring Harbor, WINDING YOUR WAY THROUGH DNA, 3 OF 6, Cold Spring Harbor Laboratory Press Co., Fulfillment Department, Plainview, NY 11803-2500, 1992  
videotape subj: DNA TECHNOLOGY  
grade(s): secondary, adult, professional

Cold Spring Harbor, WINDING YOUR WAY THROUGH DNA, 4 OF 6, Cold Spring Harbor Laboratory Press Co., Fulfillment Department, Plainview, NY 11803-2500, 1992  
videotape subj: DNA TECHNOLOGY  
grade(s): secondary, adult, professional

Cold Spring Harbor, WINDING YOUR WAY THROUGH DNA, 5 OF 6, Cold Spring Harbor Laboratory Press Co., Fulfillment Department, Plainview, NY 11803-2500, 1992  
videotape subj: DNA TECHNOLOGY  
grade(s): secondary, adult, professional

Cold Spring Harbor, WINDING YOUR WAY THROUGH DNA, 6 OF 6, Cold Spring Harbor Laboratory Press Co., Fulfillment Department, Plainview, NY 11803-2500, 1992  
videotape subj: DNA TECHNOLOGY  
grade(s): secondary, adult, professional

Micklos, David, WINDING YOUR WAY THROUGH DNA, Cold Spring Harbor Laboratory Press Co., Fulfillment Department, Plainview, NY 11803-2500, 1993.  
videotape subj: MEDICAL GENETICS  
grade(s): secondary

Micklos, David A., DNA SCIENCE: TECHNIQUE FOR THE TEACHING LAB, Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215, 1993.  
videotape subj: LABORATORY TECHNIQUES  
grade(s): middle, secondary, adult

Nelson, Jim, S.O.F.T. LIGHT HARBORPLACE CONFERENCE, Nelco Video Enterprises, 1305 K. Cedar Crest Ct., Edgewood, MD 21040, 1992.  
videotape subj:  
grade(s): professional

Neurofibromatosis Inc. and Media Concepts, IS THERE A PLACE FOR ME?, NF  
Inc. Mid Atlantic Chapter, 1993.  
videotape subj: NF  
grade(s): secondary, adult, professional

University of Michigan Education Program, FRANCIS COLLINS' KEY NOTE  
ADDRESS, University of Michigan Education Program, Human Genome  
Center, Ann Arbor, MI 48109-0674, 1993.  
videotape subj: HGP  
grade(s): secondary, adult, professional

WGBH Education Outreach, THE SECRET OF LIFE (PREVIEW), WGBH, Education  
Outreach, Boston, MA 02134, 1992  
videotape subj: BASIC GENETICS  
grade(s): secondary, adult, professional

WGBH Education Outreach, THE SECRET OF LIFE: PROGRAMS 1 AND 2, WGBH,  
Education Outreach, Boston, MA 02134, 1993  
videotape subj: BASIC GENETICS  
grade(s): secondary, adult, professional

WGBH Education Outreach, THE SECRET OF LIFE: PROGRAMS 3 AND 4, WGBH,  
Education Outreach, Boston, MA 02134, 1993  
videotape subj: BASIC GENETICS  
grade(s): secondary, adult, professional

WGBH Education Outreach, THE SECRET OF LIFE: PROGRAMS 5 AND 6, WGBH,  
Education Outreach, Boston, MA 02134, 1993  
videotape subj: BASIC GENETICS  
grade(s): secondary, adult, professional

WGBH Education Outreach, THE SECRET OF LIFE: PROGRAMS 7 AND 8, WGBH,  
Education Outreach, Boston, MA 02134, 1993.  
videotape subj: BASIC GENETICS  
grade(s): secondary, adult, professional

143 MATERIALS TOTAL

SUGGESTION FORM

Other resources to recommend:

- ☐ Book
- ☐ Booklet
- ☐ Brochure
- ☐ Computer Program
- ☐ Curricula
- ☐ Hands-on Material
- ☐ Videotape

Author:

Title:

Year:

Subject:

Publisher / Distributor:

Publisher Address:

City:

St:

Zip:

Book ISBN #:

Kit Catalog #:

Target Grade(s):

- ☐ Elementary
- ☐ Middle
- ☐ Secondary
- ☐ Adult
- ☐ Professional

Annotation:

e-mail to: [geneduc@ukanvm.cc.ukans.edu](mailto:geneduc@ukanvm.cc.ukans.edu)

or send to: Genetics Education Center - Resources  
4023 Wescoe Pavilion  
University of Kansas Medical Center  
3901 Rainbow Boulevard  
Kansas City, KS 66160-7318



## TEACHER PRESENTATIONS

Compiled by the Genetics Education Center,  
University of Kansas Medical Center, Kansas City, KS 66160-7318

1. **Keith Barnes**

Title: **Embryology and Genetics**

Description: Slide presentation on sequence of embryological development and disorders arising week to week.

Teaching Supplies: slide projector
2. **Mary Jane Bassett**

Title: **Rappin' and Replication**

Description: This project, through music, helps students to learn and to retain information about the structure of nucleic acids and the processes culminating in protein production.
3. **Jonathan Bealer**

Title: **Human Karyotyping Made Easy (and Fun)**

Description: Stylized chromosomes and photographs make karyotyping a pleasure and can lead into discussions about chromosomal abnormalities.

Teaching Supplies: Glue sticks, scissors, envelopes: 1/student
4. **Arthur Broga**

Title: **Gel Electrophoresis**

Description: I would like to explain the "Lending Library" we have developed through the Cornell Institute of Biology Teachers which includes a lab on gel electrophoresis and DNA Fingerprinting.

5. **Linda S. Davis**
- Title: **Senate Health Subcommittee Debate on Funding for Specific Genetic Disorder Associations**
- Description: Budget cuts require a reduction in Federal funding for 6 different genetic disorder associations. All sides present issues, and a subcommittee rendered a decision. (Student group learning)
- Teaching Supplies: overhead projector
6. **Sally De Mott**
- Title: **What Do Genes Have To Do With Proteins?**
- Description: DNA, chromosomes, nucleotide and genes are all related. Amino acids make proteins. Sequences of nucleotide determine sequences of amino acids in proteins. Students have a hard time seeing these relationships!
- Teaching Supplies: black board or flip chart
7. **David S. Ely**
- Title: **Let's Have A Baby**
- Description: Students are randomly paired with each other and then given 23 pairs of chromosome. Various genetic problems and defects are carried on these chromosomes. They create children by donating one of each pair of chromosomes.
8. **Tom Ford**
- Description: I will share a variety of handouts and activities I use and just recently collected at the NSTA National Convention in Kansas City.
- Teaching Supplies: overhead projector
9. **Pete Hay**
- Title: **Genetic Defects**
- Description: A slide presentation of defects that have been taken from textbooks.
- Teaching Supplies: slide projector

10. **Alan D. Hoffmann**  
Title: **DNA Profiling Activity**  
Description: Through the process of simulating treatment of DNA with restriction enzymes, electrophoresis, and radioactive probes, students determine if a baby mix up has occurred at the local hospital.  
Teaching Supplies: audiotape player
11. **Arlene Johnson**  
Title: **Investigating Inherited Human Traits from "Biology"**  
Description: This is a paper lab using coins to help determine which traits are inherited. A composite picture is drawn using these traits.  
Teaching Supplies: overhead projector
12. **Peggy Keeling**  
Title: **Independent Lab Visits**  
Description: Students conduct their own "Field Trips" to area research laboratories. They become class experts on the lab's research projects via interviews and an indepth tour of the facility. Video presentations of lab's work enables slides of "experts" to teach peers in class.  
Teaching Supplies: overhead projector, VCR and monitor
13. **Caroline Kiehle**  
Title: **Go Ahead, Make My DNA!**  
Description: A partnership was formed in Seattle between teachers and scientists to provide lab experience and equipment. Local biotechnology companies purchased 10 kits for electrophoresis, chromatography, and DNA extraction.  
Teaching Supplies: slide projector

14. **Susan Koba**  
Title: **Why Do You Have Your Grandmother's Nose?**  
Description: This is a sample genetics unit for a 7th grade science class. It overviews the basics of genetics in an interdisciplinary, multi-cultural, hands-on manner.  
Teaching Supplies: slide projector, overhead projector
15. **Pat Lamb**  
Title: **Marriage Lab / Metaphase Spread**  
Description: Students are married to fictitious partners with an established genotype and have children. Use a kit created by the University of Michigan to make a metaphase spread.  
Teaching Supplies: overhead projector
16. **Regina Lindsey-Lynch**  
Title: **Rockets into the Unknown: Diagnosing Multiple Sclerosis**  
Description: Multiple sclerosis, a disease of the central nervous system in which myelin is destroyed, is thought to be an autoimmune disease with a genetic component. This activity is used in a genetics course to illustrate several basic immunology and genetics concepts: 1. autoimmune diseases, 2. antigen - antibody complex, and 3. use of electrophoresis to diagnose diseases.  
Teaching Supplies: overhead projector
17. **Sara K. Morris**  
Title: **The Genetic Tale of Romeo and Juliet, á la Morris**  
Description: After an initial discussion of dominance and recessiveness and the use of the punnet square, this is a fun activity the students enjoy. It is designed to be a cross curriculum activity with English. Of course, it requires a discussion of the multiple allele and polygenic affects on eye color.  
Teaching Supplies: overhead projector

**Linda J. Morris**

18.

Title: **Human Genome and Public Policy**

Description: An interdisciplinary high school program (biological and social sciences) designed to explore the legal ramifications of the Human Genome Project. Parts of program: Mock Scientific Symposium, case studies, Mock Senate and current legislation.

Teaching  
Supplies: VCR and monitor

**Barbara Neureither**

19.

Title: **"Making a Baby" Adaptation of Ball State Activity**

Description: In this activity students will produce a karyotype, locate specific genes on chromosomes, carry out meiosis and fertilization and play the roll of a genetic counselor.

Teaching  
Supplies: overhead projector

**Karen E. O'Neil**

20.

Title: **Using the Mock Interview Technique to Begin a Lesson**

Description: A short mock interview using students can generate much interest at the beginning of a new unit of topic. Students begin to ask questions about issues which impinge on their content learning. This provides motivation to learn more.

**Leo J. Palmero**

21.

Title: **Forming Industry - Secondary School Alliances**

Description: Developing strategies for obtaining equipment and supplies from the corporate sector.

**Rebecca E. Ross**

22.

Title: **Simple Restriction Enzyme Mapping of a Plasmid; Slides of Genetic Defects**

Description: Techniques will be presented for teaching students how to map plasmid DNA of a bacterial cell once it has been cut by restriction enzymes.

Teaching  
Supplies: slide projector overhead projector

23. **Carolyn Rost**  
Title: **Science Material Fellowship and GTE GIFT Grant**  
Description: Learn about these exciting opportunities for math and science teachers. Sample application will be available for close scrutiny by future applicants.
24. **Gary Slaybaugh**  
Title: **Human Model of DNA Replication and Protein synthesis**  
Description: People will be used to demonstrate the essentials of the two roles of DNA in the cell.
25. **Chuck Smith**  
Title: **How DNA/Protein Research at OHSU Provided Background for a Unit in Molecular Genetics**  
Description: By working at the Oregon Health Science University on a Murdock Research Grant for two summers, I developed a unit in molecular genetics involving electrophoresis, restriction digests, cloning, mini preps.  
Teaching Supplies: slide projector
26. **Sharon Zupo**  
Title: **Inheritance of Chromosomes**  
Description: This exercise depicts the inheritance of chromosomes (with their accompanying genetic conditions) through three generations, demonstrating the percent of inheritance from grandparents being a matter of chance.  
Teaching Supplies: overhead projector, power source

## LESSON PLANS

Compiled by the Genetics Education Center,  
University of Kansas Medical Center, Kansas City, KS 66160-7318

30. **Mary Jane Bassett**
- Title: **DNA/RNA Protein Synthesis**
- Objective: To help students, through music, to learn and to retain knowledge about the structure of nucleic acids and the processes culminating in protein production.
- Supplies: instruction sheet, log sheet, rap music tape, tape players, and any props or costumes that the students choose.
- Grade Level: 9 10
- Class Time: 6 days during classtime
- 
31. **Jonathan Bealer**
- Title: **RFLP and Electrophoresis in DNA**
- Objective: To understand the mechanism and implications of DNA fingerprinting
- Supplies: colored pens or pencils (2 colors per student)
- Grade Level: 9 10 11 12
- Class Time: 1 hour, 20 minutes
- Description: Part I: the students would read an article from "Discover Magazine" titled "DNA Fingerprints: Witness for the Prosecution", June '88 pp42-52, and answer a set of questions about the article. Part II: The students are given a set of DNA fragment listings for four people: a victim and 3 suspects. They are then shown two restriction endonuclease and where these enzymes cut DNA. They are instructed to mark sites of enzyme activity and to count base units in resulting fragments. They then mark the fragments on a "gel" data sheet. As in the article, they can then discover the criminal.
- 
32. **Cissy Bennett**
- Title: **Human Genetics**
- Objective: To stimulate interest in heritable traits.
- Grade Level: 11 12
- Class Time: 50 minutes

**Description:** I have my students fill out the first side of the sheet at home. Usually, they haven't previously noted these differences that exist between people. In class we discuss the results, making sure everyone understands the relevant terms and concepts of dominance, phenotype, etc.. The other side of the sheet is then filled out in class as a groups. This generates a lot of questions and surprise that dominant traits and not always the most common. We usually include a discussion about selection of traits leading evolution.

**33.**

**Bob Cefalo**

**Title:** **Dropping Your Genes**

**Objective:** To simulate how genetic traits are passed from parents to child.

**Supplies:** paper, scissors, stapler, pencil

**Grade Level:** 9 10

**Class Time:** 30 to 40 minutes

**Description:** Using cut out paper chromosomes, students simulate the passing of selected genetic traits from two parents to a child. Students are placed in pairs (preferably boy/girl). They analyze their own genetic make-up for nine selected genetic traits. The student cuts from paper a set of chromosomes and marks them to match his or her personal traits. The pair of students then drops their chromosome sets on the desk and determines the traits and gender of their potential child. To conclude the activity, the students draw a portrait of their child.

**34.**

**Linda S. Davis**

**Title:** **Human Genetic Disorders Debate**

**Objective:** Advocate funding for a specific genetic disorder via lobbying in the senate forum

**Supplies:** overhead projector

**Grade Level:** 9

**Class Time:** 3.5 days in class; 2 days media center



**Description:** 1. Logistics for students: divide into six groups of 3-4 people. Senate subcommittee consists of seven people with one person appointed chairperson. Each group selects a disorder and is given questions to focus on for their research/discussion. 2. Logistics For Research: Media Center staff alerted as to which areas students will be seeking information. If many books are pulled from the shelves students stay on task. Minimum of two days to find, write, and document sources. 3. Logistics for the Debate: one day for the group to decide roles, order of presentation, prepare visual aids, etc.. Prescribed debate format followed with an open-ended style. Subcommittee ask questions for each group, records answers, keeps order and allows a good flow for discussion. Subcommittee adjourns for discussion. Reasons for their decision must be made. Videotaping allows keeping track of participation and good public relations for parents' night.

35.

**Richard G. Dawson**

**Title:** **Poetic Approach to Genetics**

**Objective:** To involve more students more fully in understanding by having them translate genetic concepts into poetic form. (i.e., to stimulate divergent thinking among the narrow-focused, and to reach out and catch the imagination of those out-of-focus students and bring them in.)

**Supplies:** directions, examples (printed or oral)

**Grade Level:** 7 8 9 10 11 12

**Class Time:** 2 class periods or more

**Description:** Science educators ask students to respond to short-answer and essay questions about facts and concepts. We ask them to summarize book excerpts and magazine article for literature reviews. We ask them to describe laboratory exercises or their own research investigations. All of these are too often cast in lifeless, stodgy, and stilted prose, as are the papers of professional scientists. We need more ways to spark the imagination of uninvolved students, to stimulate the science-bound to write better, and to entice creative writers into becoming interpreters of the fun and excitement of science for the general audience. One way is by reading how the discoveries, ideas and practices of sciencing have been tweaked by the careful and colorful word-choice of poetry. I have put together a number of poems I have found useful to illustrate various topics, have written some, and each year publish student poems.

36.

**Sheryl Dominic**

**Title:** **Debate Format for Biology Class**

**Objective:** To enable students in debating moral and ethical issues relating to biology

**Supplies:** pad of large sheets of paper, magic markers, stop watch.

**Grade Level:** 7 8 9 10 11 12

**Class Time:** 3 class periods minimum

**Description:** This lesson plan outlines a strategy to engage biology students in debate. first, a proposition is written. Then, students work in cooperative groups to investigate pro and con arguments and to outline them on large sheets of paper. One student from each group is selected to participate in the debate following the format in the lesson plan. One student is selected to serve as moderator and time keeping. Other class members serve as judges and prepare reports outlining their opinions on the debate. Following this plan, all students play an active role in debating a societal issue relating to biology.

37.

**Peggy Farmer**

**Title:** Genetic Inheritance

**Objective:** Improve students understanding of how traits are inherited

**Supplies:** jellybeans, jelly bellies, disposable cups or beakers

**Grade Level:** 9 10

**Class Time:** 30 minutes

**Description:** Each cup contains both jellybeans and jelly bellies. The jelly beans represent the genes coding for hair color with black being dominant over white. The jelly bellies represent genes coding for eye color. Brown is dominant over blue. Draw 1 jellybean from each cup. List their genotype and phenotype, then return them to the cup. Repeat 10 times. These represent the offspring. Repeat drawing 1 jellybean and 1 jelly belly from each cup. Make sure to return to the appropriate cup. Again state the genotype and phenotype for each child.

38.

**Maureen Floor**

**Title:** Chances' Choices Curriculum Ma

**Objective:** To familiarize students with various human genetic disorders and to involve them in debates over various bio-ethical decisions

**Supplies:** overhead projector

**Grade Level:** 10 11 12

**Class Time:** 2 - 4 weeks

**Description:** This module, created by GENESYSterns, provides the students with various scenarios depicting the real life situations faced by the Chance family. The scenarios provide the students with background information on some common genetic disorders. At the same time, the module requires students to become familiar with pedigree analysis. By learning the "cast of characters", students develop an understanding of how these disorders are inherited by family members. I've used this module for about three years and I'm always amazed at the level of motivation by the students. They become extremely dismayed when we have to leave the module. As a matter of fact, this year I continued the module by having them write the final episode of the Chances' Choices.

**39. Maureen Floor**

**Title:** Doodle bug to analyze Karyotype

**Objective:** To construct a karyotype from the metaphase chromosomes of the doodle bug and then analyze prepared karyotypes for chromosome abnormalities

**Supplies:** Mackintosh computer, optical viewer

**Grade Level:** 9 10 11

**Class Time:** 1 - 2 class periods

**Description:** This activity was developed from a lab activity found in "The Dynamics of Life Laboratory Manual" from Merrill Publishing Co., 1991. It uses a doodle bug graphic to show how a change in the chromosomes causes phenotypic changes in the doodle bug. It requires the student to construct a karyotype and analyze prepared karyotypes. This lab was developed as part of a summer program at Brown University.

**40. Robert L. Garrison**

**Title:** Bioethics and Biotechnology

**Objective:** Debating Bioethics

**Supplies:** current articles regarding biotechnology

**Grade Level:** 10 11 12

**Class Time:** 9 - 12 class periods

**Description:** This activity uses debate as a unit culmination vehicle of an 8 week biotechnology study that has covered the basic concepts and lab experiences pertaining to molecular genetics and DNA science. At the end of this unit, students will be able to: identify, understand, and discuss many of the ethical questions related to biotechnology; use critical thinking skills to analyze complex questions; formally debate and evaluate issues and arguments concerning biotechnology.

**41. Cheryl L. George**

**Title:** Gene Regulation

**Objective:** To discover how the Lac Operon works through the use of a manipulative.

**Supplies:** scissors, stiff paper, tape

**Grade Level:** 10 11 12

**Class Time:** 50 minutes

**42. Becky Goodwin**

**Title:** **Advances in Techniques & Tech.**

**Objective:** Generate discussions about modern technology and genetics.

**Supplies:** 35mm slide projector or photo CD system

**Grade Level:** 9 10 11 12

**Class Time:** 50 minutes

**Description:** I never try to start a discussion or introduce a topic without some photo, drawing, or model. I have developed a series of slides (now on a photo CD) which are readily available to recall as needed depicting advances in genetic-related material, concepts connected to genetics, and headlines from magazines, newspapers, or other sources. Students have an ongoing assignment to bring articles to class from a variety of sources relating to health, genetics, and environmental issues. This helps them become more aware of issues, helps create good reading habits, and helps my picture/concept file grow. Students do not have to give me the magazine (I just photograph the article or story), and we xerox the newspaper stories. These materials generate discussions, from scientific explanations, to ethical content on an ongoing basis. We have a hallway bulletin board where this information is displayed for all to see.

43.

Pete Hay

**Title:** **Genetic Counseling**

**Objective:** To become familiar with the human problems of occurrence or risk of a genetic disorder.

**Grade Level:** 10 11 12

**Class Time:** 2 - 3 days (depending on class size and enthusiasm)

**Description:** Near the end of the genetics unit I divide my class into groups. Each group is responsible for preparing a script that would simulate a real situation. After the assignment of players and their roles, students role-play a genetic counseling session in front of their peers. Following the role-playing session, class members ask questions and make comments about the genetics of the session as well as the dialogue. This activity is especially valuable for students that have difficulty participating in a group situation. Students pick their own genetic condition and write their own script.

44.

Alan Hoffman

- Title:** **Biology - Genetics**
- Objective:** To understand human inheritance and genetic recombination
- Supplies:** coins, paper for making sketches, pencil
- Grade Level:** 7 8 9 10 11 12
- Class Time:** 45 - 50 minute period
- Description:** Students receive a list of 30 facial characteristics which includes the mode of inheritance of each and a sketch of the phenotypes that could result. One example would be widow's peak hairline. (WW or Ww)-present; (ww)-absent. Students working in teams of two simulate the role of heterozygous parents by flipping coins (which represent gametes) to determine the trait that their one offspring will inherit. Heads represents the dominant allele; tails the recessive. The coin is tossed along with that of the partner's for each of the 30 characteristics. The resulting combination of coins (zygotes) is recorded for each trait. Students then make a composite sketch of "their child" as she/he would appear as a teenager based upon the phenotypic sketches provided and the genotypes inherited. The sketches are displayed in the classroom. One very positive aspect of this activity is the realization by students of the process of genetic recombination. All parents are genetically the same yet the offspring, when compared, display remarkable phenotypic differences. A similar laboratory appears in Miller-Levine's Biology Laboratory Manual - Prentice Hall, 1991.

45.

Susan Koba

- Title:** **Human Genetics Unit**
- Objective:** To simulate the ways characteristics are passed from generation to generation.
- Grade Level:** 7 8 9
- Class Time:** 2 - 3 weeks
- Description:** The students explore the principles of human genetics by participating in a variety of activities that simulate the ways that characteristic are passed from generation to generation.
- Learning outcomes include: Content: human reproductive cycle, mitosis, meiosis, probability in genetics, diversity, modes of inheritance, sex determination, determining disorders through karyotyping, ethical decision-making. Process: observation, measurement, organization, prediction, record-keeping, gathering information, models, experimentation, problem-solving, listening, group presentations, reading, writing, electronic communication. Teaching Strategies: puzzle game, cooperative learning, case studies, models, student presentations, microscope lab investigation, role plays, student library research.

46.

Steve Kruse

Title: **Biology**

Objective: To experience some of the problems of a specific disease.

Supplies: Tempera paint

Class Time: 1 period prep and research, 1 period discussion

Description: This exercise is designed to allow the student to experience some of the problems associated with this disease. The student wears a mark on his or her face or a sign pinned to clothing identifying the student as "diseased". The students then have a paper due describing the experience. This assignment works well after doing the BSCS module of Human Genome. These activities coupled with the research on his or her condition give the student a good basis for teaching other students and teachers about ramifications of the disease.

47.

Regina Lindsey-Lynch

Title: **Rocket Electrophoresis**

Objective: Genetic nature of autoimmune diseases; antigen-antibody complex

Supplies: overhead, electrophoresis equipment, micropipette equipment

Grade Level: 9 10 11 12

Class Time: 3 class periods

48.

Mary Carroll McCaffrey

Title: **Face Lab**

Objective: To present Mendelian Genetics using facial characteristics.

Supplies: paper (8 1/2 X 11 or larger, or newsprint paper) or drawing boards; crayons or markers, one coin for each student.

Class Time: 2 class periods

Description: Students assume they are heterozygous for each of the 29 facial characteristics. Working in pairs (one husband and one wife) the students each flip a coin to determine if they are contributing a dominant gene or a recessive one to this particular offspring. The resulting genotype and phenotype are recorded until all 29 traits are listed. Then the students draw the person they "created". If MacPaint is available on a classroom set of computers, the faces can be drawn this way, and then colored in. Since all sets of parents are genetically the same, it is easy for the students to conclude that there are many possible combinations of offsprings. These papers or boards make excellent classroom decorations for the rest of the genetics unit. Hand-out: List of Traits

49.

**Carole McRight**

**Title:** **Who Dun It?**

**Objective:** To become familiar with forensic pathology techniques

**Supplies:** DNA extraction kit (Carolina 21-1149 electrophoresis equipment)

**Grade Level:** 10 11 12

**Class Time:** Five 55 minute class periods

**Description:** Students view a crime scene where a bakery worker (a member for the class) has been "strangled". They gather clues, such as a footprint in spilled flour, a drip of blood on a recipe card (actually food coloring), a hair sample found also on the recipe card, tissue from under the fingernail of the victim (macerated liver), and the rope form around the victim's neck. The footprint is sketched and a photo is taken. (A cast could be poured.) The hair sample is examined under the microscope and a photo taken. Tissue from the fingernail is collected and becomes the source of extracted DNA. You can use a DNA extraction kit with Freeze dried E. Coll to simulate actual human DNA or macerated dog testis can be placed under the fingernail and DNA extracted following the standard extraction procedure. A DNA profile can be made. To simulate the creation of a human profile, use Restriction Enzyme Cleavage of DNA Kit. Using gel electrophoresis, load uncut DNA in well #1, DNA cut with Eco RI (which represents the suspect #1's DNA) into well #2, DNA cut with Hind III (which represents suspect #2's DNA) into well #3, and DNA cut with Eco RI again (which represents the tissue taken from the victim's fingernail) into well #4. Students will compare the bands and determine whether suspect 1 or 2 is the killer. After looking at all the evidence gathered at the crime scene and the DNA analysis, the two suspects are brought into the classroom. From the DNA profile, they know who the murderer is, but they also look for hair color, shoe pattern, cuts and scratches, etc.. The students determined that the physics teacher was the culprit. (He had been gracious enough to step in the flour and donate several strands of hair.)

50.

**Bruce Miller**

**Title:** **Human Genome Project Overview**

**Objective:** To present a cohesive overview of the Human Genome Project.

**Supplies:** Printed materials, overhead projector and transparencies

**Grade Level:** 11 12

**Class Time:** 2 - 3 periods

**Description:** When I present this material, my Biology II students spend considerable time learning about the "Technology of DNA" and have done hands-on labs while dealing with gel electrophoresis of DNA and protein and planned DNA.

This is the first attempt at teaching the details of the Human Genome Project and the development of this material was as much for my benefit as theirs. The stapled four page material was given to the students to read. Then we spent the next 2 - 3 days going over the material and the graphics I produced. I liked the unit because there are a great many concepts that both I and my students found enjoyable and challenging.

I thought the unit went well and I plan to update and modify it for next year.

**51.**

**Linda J. Morris**

**Title:** Human Genome and Public Policy

**Objective:** To explore the legal and social ramifications of the Human Genome Project

**Grade Level:** 9 10 11 12

**Class Time:** two weeks



**Description:** HUMAN GENOME AND PUBLIC POLICY is an interdisciplinary high school program (biological and social sciences) designed to explore the legal and social ramifications of the world-wide Human Genom Project (HGP). This program emphasizes critical thinking skills and provides instructional materials for all parts of the program, including the scientific symposium, the case studies, the senate and the current legislation.

**BACKGROUND FOR THE HUMAN GENOME PROJECT:** The HGP, being compared in magnitude to the Manhattan project, thrusts students into what many scientists refer to as a "revolution". Over the next fifteen years, an estimated 100,000 genes will be "mapped and sequenced", allowing scientists to determine a person's propensity to disease, years before cures are found. The focus of this program is to involve students in decision-making processes surrounding the social and legal dilemmas created as a result of the new science technology.

**PART 1 SCIENTIFIC SYMPOSIUM:** The program begins as the classroom is turned into a scientific symposium. Following the presentation of essential background information regarding the HGP, student teams research and present information regarding a genetic disease recently discovered as a result of the HGP.

**PART 2 CASE STUDIES:** Equipped with the knowledge of several genetic diseases, the students are placed in the public realm to solve case studies related to the genetic disease. For example, if the genetic disease of colon cancer had been researched, the student team would discuss a case study about a young man who, during a pre-employment physical, discovers that he has a gene for colon cancer. The students would identify issues surrounding the case study such as whether or not the young man should be hired, whether or not his wife, his children, his insurance company should have access to this information, etc. Worksheets are used to help the students clarify these issues.

**PART 3 MOCK SENATE:** Following the identification of the issues, preparation is made for the mock senate. The students become senators working in committees to draft bills. Using simplified parliamentary Rules, the senate convenes at which time authorship, proponent and opponent speeches are made in order to persuade the mock Senate to pass legislation. Compromises in the form of amendments are needed to pass bills. Great excitement is generated as students use their knowledge of the HGP, their critical thinking skills and their powers of logic and negotiation to pass their committee's bill.

**PART 4 CURRENT LEGISLATION:** As a wrap-up, each student is given a copy of the current law that is supposed to "protect" those predisposed to genetic disease. The students list the strengths and weaknesses of this law - The Americans with Disabilities Act (ADA 1991) - and decide whether or not it should be amended.

**PART 5 EVALUATION:** Written evaluation includes the research paper (part 1), the issues surrounding a case study (part 2), the justification concerning the law (part 4). Evaluation of the scientific symposium and senate (parts 1 & 3) includes a videotape for portfolios. Evaluation of group participation is in checklist form (parts 1 & 4).

52.

Sara Morris

- Title:** **Mitosis-Meiosis-Gene Inheritance**
- Objective:** An inexpensive hands-on method to show Mitosis-Meiosis-Gene inheritance
- Supplies:** mitosis, etc transparencies, video and laser disk, compass, colored markers, construction paper 24 X 36, various colored construction papers, scissors, glue.
- Grade Level:** 10
- Class Time:** Mitosis 2 classes; Meiosis 2 classes; Gene Inheritance 2 classes
- Description:** Purpose: Mitosis is simple cell division. During mitosis, a cell divides into 2 daughter cells that each contain the same number of chromosomes as does the parent cell. Meiosis is reaction division. During meiosis a cell divided into two cells that each contain half the number of chromosomes as did the parent cell. The purpose of this activity will be for you to model what happens in the nuclear area of cells that go through mitosis and meiosis. When you are finished you should be able to explain how "G-Whatsit" grows, repairs and reproduces. After discussing gene inheritance on chromosomes, you will then use your model to follow the progress of selected genes on the model.

53.

Barbara Neureither

- Title:** **Genetics**
- Objective:** To explore how genetic traits are passed from one generation to another
- Supplies:** overhead projector, tape, scissors, dice, resources for genetic conditions.
- Grade Level:** 10 11 12
- Class Time:** 3 class periods or more
- Description:** Students will produce a karyotype using a metaphase spread of "cartoon" chromosomes. They will organize them in the karyotype using size, banding pattern and centromere location. Students locate nine specific genes on the chromosomes using standard notation such as 7q12. The genes will be assigned in such a way as to make the individual a "carrier" for the recessive disorders. Students carry out meiosis 1 using dice to determine which chromosome from each pair will be passed on to the sex cells. They will use scissors to cut the double chromosome in half to perform meiosis 2. Students carry out fertilization by combining the chromosomes in their sex cell with those in another sex cell from a classmate. The chromosomes will be organized into a karyotype for the offspring. Students become genetic counselors who analyze the karyotype for genetic disorders, determining what the child may encounter in the future. Student do research about the disorders the child may encounter in the future and then prepare a report for the doctor and parents of the child. Then students carry out a discussion with classmates who are acting as parents of the affected child. Answering their questions about what the future holds for their child and their family.

54.

Karen O'Neil

**Title:** Recombinant DNA, Modern DNA Technology

**Objective:** Sensitizing students to one of the ethical issues in this area and give motivation to learn

**Grade Level:** 9 10 11 12

**Class Time:** 15 - 20 minutes

**Description:** A mock interview between the personnel director of a chemical company (teacher) and a prospective researcher (student volunteer) is conducted at the beginning of a unit.

55.

Mark Salminen

**Title:** Genetics

**Objective:** Review the major concepts of genetics

**Supplies:** IBM computers

**Grade Level:** 9 10

**Class Time:** variable

**Description:** This computer program developed by the WISD in Ann Arbor, MI is designed to allow students to reinforce concepts and material concerning genetics. A novel approach is used which allows students to select correct or incorrect answers and be faced with reading material which tells them why they are correct or wrong.

56.

Barbara Silber

**Title:** Ethical Aspects of Testing

**Objective:** Discover some of the complexity in the ethical questions related to genetics testing and screening

**Grade Level:** 9 10 11 12

**Class Time:** 1 period of discussion

**Description:** Is genetic screening desirable for pre-pregnancy or premarital situations? If every person carries 6 or 7 deleterious genes, which diseases should be tested for? The most common? The most likely? Just because we can locate mutations should we test for them? Is it cost effective? Is it necessary? Is it beneficial and for whom? Certain diseases such as Cystic Fibrosis and Tay-Sachs are caused by one of several mutations. Just because scientists know two common mutations, the tests (negative results) don't eliminate all possibilities of the disease. Individuals might be told they are 70% to 80% free. How many mutations do you look for? When do you stop looking? Is 80% surety enough? If technology is available should you test everybody for everything? Where do you allocate precious dollars? Do you stop at one level of knowledge or certainty? Do you test for "esoteric" diseases? What if someone is part of an inbreeding group? Some tests are inconclusive. Perhaps the individual is a carrier, but not definitely. How would you feel and what would you do if told that a test is inconclusive. if a couple goes ahead with a pregnancy test on the embryo, then the decision is a different one: choosing abortion, not choosing abortion, or perhaps somatic gene therapy.

57.

Gary Slaybaugh

**Title:** Mitosis / Meiosis

**Objective:** Teach mitosis and meiosis through hands-on activities.

**Supplies:** 6 red, 6 white, 6 blue skeins of yarn, 6 rolls of scotch tape, 24 pairs of scissors for a class of 24.

**Class Time:** 1 period & homework session for teacher; 4-5 periods for students

**Description:** Yarn will be used to demonstrate the stages of mitosis and meiosis.

58.

Chuck Smith

**Title:** Genetics Karyotyping

**Objective:** To learn to karyotype in order to match with pictures.

**Supplies:** overhead and slide projector

**Grade Level:** 9 10

**Class Time:** 3 days

**Description:** Judy Capra Program  
Day 1: Students are shown large photographs of 5 humans. After a brief discussion of each photographed person's features, students cut out stylized chromosomes with the purpose of matching the karyotypes with the pictures.  
Day 2: Students compare the 5 karyotypes and try to match karyotype with the 5 people. Students record these features, then discuss what one can determine by karyotyping.  
Day 3: Students observe overlays and slides of completed karyotypes, discuss Down's Syndrome, Edward's Syndrome from a human perspective. Show chromosome mutation and prenatal diagnosis techniques. Show a sonogram.

59.

**Chuck Smith**

**Title:** MiniPrep  
**Objective:** Learn how to extract plasmids from bacteria.  
**Supplies:** JM101 bacteria with plasmids such as PUC 19, centrifuge, promega magic mini prep.  
**Grade Level:** 11 12  
**Class Time:** 1 period

60.

**Susan Sprouse**

**Title:** Recombinant DNA Using Plasmids  
**Objective:** Understanding process of recombinant DNA using paper / paste simulation  
**Supplies:** Instructions and colored paper sheets: enzymes, cell DNA, plasmid, answer sheet, scissors, tape  
**Grade Level:** 9 10 11 12  
**Class Time:** 2 class periods for work; 1/2 class period for pre-lab  
**Description:** Working in pairs, students simulate the process of selecting the proper enzyme to cut plasmid and cell DNA (close to insulin gene) and then use ligase to join the pieces together. Finally they determine how to test for plasmid uptake.

**Sharon Zupo**

**61.**

**Title:**                   **Inheritance of Chromosomes**

**Objective:**           To illustrate the pattern of chromosome inheritance through three generations

**Supplies:**           overhead projector

**Grade Level:**       10 11 12

**Class Time:**       2 - 3 days

**Description:**       Students usually think of genes, not chromosomes, being inherited from parents. This lab demonstrates chromosome inheritance through their generations and illustrates the fact the grandchildren do not automatically inherit 25% of their grandparents' genetic make-up. This lab includes karyotyping techniques and is also excellent for reinforcing (or introducing) genetic terms such as dominant, recessive, homozygous, heterozygous, loci, homologous chromosomes, sister chromatids, polygenic inheritance, crossing over, etc.

**TEACHING IDEAS ABSTRACTS**  
**Compiled by the Genetics Education Center,**  
**University of Kansas Medical Center, Kansas City, KS 66160-7318**

**1. Margaret Bartlett**

Title: Student-led discussions on Concepts of Their Choice

Objective: To engender student responsibility for student learning.

Grade Levels: 9 10 11 12 U

Description:

This is a technique that I have used for classroom discussion of such topics as "spontaneous generation" and "Are viruses alive?". Rhodes and Schaible of Southern Maine University devised the process which I have adapted to my needs.

Presentation: Wednesday from 10:35 to 10:45

Location: Westport Room

**2. Jonathan Bealer**

Title: Human Genetics and Bioethical Decision Making

Objective: Help students deal with ethical dilemmas

Source: Dr. Jon R. Hendrix, Ball State University, Muncie, IN

Grade Levels: 7 8 9 10 11 12 U

Description:

Begin with a short discussion about ethics and morality. Then, provide a decision-making model for teachers to use in their classroom and show them how to focus the discussion.

Presentation: Thursday from 3:30 to 4:00

Location: Hotel Lounge

**3. Bob Cefalo**

Title: The Human Genome Project: An Introduction

Objective: To give students an introductory activity and video experience to the purpose of the Human Genome Project.

Grade Levels: 9 10

Supplies: video "The Human Genome Project", paper, pencil

Description:

Using sample maps and short descriptions of various locations, the students place towns in a road map. This concrete experience leads to a video "The Human Genome Project". While the video is playing, students answer short answer questions about what they are viewing. The hour is complete with a short reading compiled from various sources. The students complete some questions about the reading, extending basic facts to set the stage for the ethical, legal and social activities to follow on other days.

Presentation: Thursday from 12:30 to 12:40

Location: Stanfords

4.

Linda Davis

Title: Engineering Genes

Objective: The positive effects from accidental discovery of altering a gene.

Source: Prentice - Hall

Grade Levels: 9 10 Supplies: overhead

Description:

From Prentice - Hall's "A Gene For All Seasons", a creative method of demonstrating the concept of how genetic engineering evolved. Students developed a storyboard and shared visually what they believed was the object of the article.

Presentation: Wednesday from 3:45 to 3:55

Location: McCoy Room

5.

Linda Davis

Title: Mendelian Patterns of Genetics

Objective: Illustrates the meiosis and genetic variation

Grade Levels: 8 9 10 Supplies: overhead

Description:

Students are presented the concept of meiosis and variation in genes using an imaginary organism composed of 7 pairs of chromosomes. Following directions builds new generations to specific plans. Misread directions results in mutations. Many ideas for additional activities could be generated. Activity developed at the University of Wisconsin.

Presentation: Wednesday from 3:30 to 3:45

Location: McCoy Room

6.

Sheryl Dominic

Title: Concept Mapping: the Human Genome Project

Objective: To create a visual representation of the relationships among ideas relating to the Human Genome Project.

Grade Levels: 7 8 9 10 11 12 U Supplies: overhead projector

Description:

A concept map is a visual representation of the relationships among ideas. Concept maps encourage students to organize and synthesize information in a meaningful way and provide teachers with a useful tool to evaluate student understanding. This presentation will show how concept maps can be constructed on the Human Genome Project.

Presentation: Thursday from 4:20 to 4:30

Location: Hotel Lounge

7.

Bob Garrison



Title: Random Pool / Gene Pool Set

Description:

Discussion of classroom use of this hands-on kit from Ward's.

Presentation: Tuesday from 9:15 to 9:30

Location: Westport Room

8.

David Glenn

Title: Student Medical History Project

Objective: To research one's medical history and analyze its implications.

Grade Levels: 11 12

Supplies: slide projector and screen

Description:

The Family Medical History is a project I have my pathology students complete. Using a family tree as a vehicle, students research causes of death, medical afflictions, and age of death. A detailed statistical analysis of longevity and causes of death is required.

Presentation: Wednesday from 9:40 to 9:55

Location: Westport Room

9.

Lana Hays

Title: A Biotechnology Unit for High School Biology

Objective: Hands-on experience with biotechnology, writing skills, portfolio development.

Source: two of the labs come from DNA Science and Carolina

Grade Levels: 10 11 12

Supplies: overhead projector

Description:

Students study topics of DNA, DNA fingerprinting, restrictive enzymes, transformation, and genetically engineered food and then perform labs such as DNA extraction, restriction enzymes, and transformation. Students also study real state police autorads to determine the paternity, and innocence or guilt in a sexual assault case. Creative writing assignments are used throughout such as creating stories that use DNA fingerprinting or the defense of the use of DNA fingerprints as evidence in court. Students also develop and advertise presentation and math portfolio entries. The work is then compiled in a "Biotechnology Portfolio". This unit takes a complete quarter and the biotechnology portfolio represents the quarter grade.

Presentation: Wednesday from 10:20 to 10:35

Location: Westport Room

10.

Title: Paper Clip Set

Margaret Hess

Description:

Discussion of classroom use of this hands-on kit from Ward's.

Presentation: Tuesday from 9:00 to 9:15

Location: Westport Room

11.

Title: Discrepant Events in Enzyme Laboratory

Frank Jahn

Objective: Enzymes, critical thinking, scientific method

Source: original idea

Grade Levels: 9 10

Supplies: slide projector, overhead

Description:

Laboratory exercises with unexpected results often dramatically demonstrate scientific concepts. Students conduct a simple analysis of the ability of commercially available lactase to break down lactose to monosaccharides. They are then asked if lactose can break down other disaccharides. Students employing poorly constructed experimental design have a positive result. The erroneous results clearly demonstrate to the student the importance of controls and standards and the specificity of enzymes. Two other discrepant labs may be discussed if time permits. Grading rubrics are also distributed.

Presentation: Thursday from 2:00 to 2:15

Location: Stanfords

12.

Title: Mitosis Chromosome Phenomena Demonstration Set

Arlene Johnson

Description:

Discussion of classroom use of this hands-on kit from Ward's.

Presentation: Tuesday from 8:45 to 9:00

Location: Westport Room

**Susan Koba**

**13.**

**Title:** Building and Analyzing Pedigrees

**Objective:** To construct and interpret a family pedigree based on research of family traits.

**Grade Levels:** 9 10 11 12

**Supplies:** Large art/post paper or access to PediDraw computer program

**Description:**

This activity is an independent homework assignment designed to bring closure to a variety of concepts: modes of human inheritance, building of pedigrees, interpretation of pedigrees by genetic counselors and respect for diversity. Prior to this activity, students have completed a modified version of the Marriage Lab (presented by Pat Lamb during the 1993 HGP Workshop). I modified this activity so that it was completed in class by partners. We then laid the groundwork for use of pedigrees by genetic counselors, practiced making and interpreting pedigrees and completed some ethical issues decision-making related to human disorders. This activity assessed student understanding of modes of inheritance and pedigree construction / interpretation. They had one month to research a disorder or trait in the family, construct a four-generation pedigree for that trait / disorder and determine its mode of inheritance. Students were required to complete both a pedigree and a booklet describing their trait / disorder and what it is like to have that trait.

*Presentation: Thursday from 12:40 to 12:55*

*Location: Stanfords*

**14.**

**Joe LaFerriere**

**Title:** Legal and Ethical Issues Regarding Job Discrimination

**Objective:** To practice taking a well developed position on an issue.

**Source:** BSCS

**Grade Levels:** 9 10 11

**Supplies:** BSCS lab activity: The Case of Nathaniel Wu

**Description:**

Do the BSCS curriculum: Mapping and Sequencing the Human Genome: Science, Ethics, and Public Policy with the following changes:

1. Present to an adult panel with a lawyer, nurse and school administrator.
2. Have students switch positions to represent the pro and con sides regarding the hiring of Nathaniel Wu. And, present to a new panel of the same kind professionals but different people.
3. Have a go-round afterwards with the panel present where each student and adult is allowed to make comments regarding the entire event and process.

*Presentation: Thursday from 12:30 to 12:50*

*Location: McCoy Room*

**15.**

**Bill Limes**

**Title:** Human Genetics and Biotechnology

**Objective:** A two semester, team taught genetics curriculum.

**Source:** Multi-media

**Grade Levels:** 11 12

**Supplies:** overhead, slide projector

**Description:**

Keith Barnes and Bill Limes have collaborated in developing a team taught Human Genetics Program as a Pilot Project at Olathe South High School, Olathe, KS in 1993. The program has been considered successful enough to be taught at Olathe North High School, Olathe, KS during the 1994-95 academic year as well as at Olathe South High School. The course is divided into 2 one semester courses, Genetics I and II. In Genetics I, students are exposed to the molecular basis of inheritance. In Genetics II, a clinical approach to human genetics is followed including a two week mentorship, various field trips and guest lectures from experts in the field. Many of the teacher presentations are interactive for student and teachers simultaneously. Some cooperative learning is accomplished when appropriate.

*Presentation: Wednesday from 3:55 to 4:25*

*Location: McCoy Room*

**16.**

**Carole MacMullan**

**Title:** Human Karyotyping Lab Activity

**Objective:** Students will describe the role of meiosis and fertilization as well as Mendel's Laws in determining the human genome.

**Grade Levels:** 7 8 9 10 11 12

**Supplies:** Overhead

**Description:**

I have designed a classroom set of human male and female chromosomes based on Susan Offner's "Plain English Chromosomes" that was published in the October 1993 edition of Biology Teacher. Both the male and female kits contain 23 monoploid chromosomes in which 8 or 9 human genes are shown. Students are paired up with the opposite sex. The male student receives a packet of 23 blue paper chromosomes, and the female student receives a packet of 23 pink paper chromosomes. The students pair up the chromosomes by number until the complete diploid set of 46 chromosomes is created. After all the maternal and paternal chromosomes are paired, the students use Mendel's Law of Dominance to determine the genetic traits of their paper baby. Each baby has the misfortune to inherit a genetic disease, and each couple must obtain information from a genetic counselor (a student or teacher) on the disease for which they write a report.

*Presentation: Wednesday from 10:55 to 11:15*

*Location: Westport Room*

**17.**

**Ellen Mayo**

**Title:** The HGP Telecourse: "Exploring the Scientific and Humanistic Dimensions"

**Objective:** National availability of scientific and ELSI issues related to the Human Genome Project via satellite telecourses.

**Source:** MCET, Boston, MA

**Grade Levels:**

**Description:**

Students and teachers participated in a teleconference this Spring on the scientific and bioethical issues raised by developments in human genetics.

*Presentation: Thursday from 1:30 to 2:00*

*Location: Stanfords*

**18.**

**Judy McCain**

**Title:** Bioethics Research

**Objective:** Student research into a bioethical issue will lead to greater understanding of both sides of the issue.

**Grade Levels:** 10 11 12

**Description:**

I will briefly describe how my second year biology class researched and presented a bioethical issue.

*Presentation: Wednesday from 10:10 to 10:20*

*Location: Westport Room*

**19.**

**Marlys McCurdy**

**Title:** Colonizing Mars: An Ethical Dilemma

**Objective:** Discuss ethics of genetic engineering for human gain other than medical purposes.

**Source:** synthesis of many

**Grade Levels:** 12

**Description:**

We worked as autonomous study groups to each cover a particular need for colonization of Mars. For instance, one group would deal with life support systems for the human colonists. All solutions and mechanisms designed must incorporate ideas based on genetic engineering. If no such technology exists, students must use comparable techniques and extrapolate! A review panel of "Learned Experts" will hear testimony for and against each groups proposals and determine the outcome of the mission.

*Presentation: Thursday from 12:50 to 1:15*

*Location: McCoy Room*

**20.**

**Anne McDonald**

**Title:** The DNA Daily Deliberator

**Objective:** Introduce DNA fingerprint analysis problems

**Source:** Dr. Eric Achberger, Louisiana State University, Department of Microbiology, Baton Rouge, LA

**Grade Levels:** 7 8 9 10

**Supplies:** overhead projector

**Description:**

The "Daily Deliberator" is a "newspaper" filled with stories about fictional crimes and other current problems that may be solved using DNA fingerprint analysis. After reading the "paper", students are given DNA fingerprints for each article, which they use to try to "close the case".

*Presentation: Thursday from 2:15 to 2:30*

*Location: Stanfords*

**21.**

**Sharon Mensing**

**Title:** Paper Clip Set

**Description:**

Discussion of classroom use of this hands-on kit from Ward's.

*Presentation: Tuesday from 8:30 to 8:45*

*Location: Westport Room*

**22.**

**Bruce Miller**

**Title:** A Look at Bioethics

**Objective:** To present and discuss some ethical dilemmas

**Source:** A modification and development of materials presented during the 1993 HGP workshop.

**Grade Levels:** 11 12

**Description:**

From the 1993 Genetics Education Workshop, I was impressed at how big a role ethics plays in all of the new breakthroughs in biotechnology.

I took some of the case studies from last year's workshop and with a short introduction to ethics, I had my AP Biology II class break into groups and discuss one case study. I gave the students a set of guidelines to use as a basis for their discussion and used a Potter's Box as well.

*Presentation: Thursday from 4:30 to 4:40*

*Location: Hotel Lounge*

**23.**

**Daryl G. Miller**

**Title:** Crooked Cell Mysteries: Some Interactive Approaches to Teaching About Sickle Cell Anemia

**Objective:** To prepare and observe a model of blood with sickle cells. Manipulate models of blood cell to gather data and make inferences about sickle cell anemia. To work cooperatively to develop an explanation for sickle cell anemia symptoms.

**Source:** City Lab, Boston University School of Medicine

**Grade Levels:** 7 8 9 10 11 12 U **Supplies:** overhead

**Description:**

This teaching method enables hands-on, interactive approaches for teaching about sickle cell anemia and the connection between hemoglobin and disease symptoms. The materials needed include: zip lock bags, rice, marshmallows, red hots, elbow macaroni, water, a model of capillary made from tygon tubing, clay blood cell models, models of normal hemoglobin and affected hemoglobin in red blood cells. Working in teams, students will construct a model of sickle cell blood and compare it with normal blood. They will read a story about a sickle patient and be told to discover as much as they can about the disease and try to establish what is happening in the patient to cause the symptom.

*Presentation: Wednesday from 10:45 to 10:55*

*Location: Westport Room*

24.

Title: Popit Bead Kit

Sara Morris

Description:

Discussion of classroom use of this hands-on kit from Ward's.

Presentation: Tuesday from 8:15 to 8:30

Location: Westport Room

25.

Title: Can Genetics Make Reading "Fun"?

Sara Morris

Objective: To make genetics and medical topics more familiar and current.

Source: The English teacher and I worked on this cross-curriculum. she also used the books for regular book reports.

Grade Levels: 11 12

Supplies: Some of the books might be a bit touchy with parents. They must all be read by the teacher first.

Description:

Knowledge of Genetics can make reading fun. My senior physiology students are given a book such as: "Devil's Waltz" by Jonathan Kellerman, "Jurassic Park" by Michael Crichton, "Terminal" by Robin Cook. After reading the book the students have to copy 10 scientific passages, then discuss the meaning of the scientific passages and why the author thought it was necessary to include these elements of science in order to develop the plot. This was a very successful activity. Students who don't like "school" novels really enjoyed these books. In fact, I'm having an hard time keeping track of by books as students are continuing to read them for ENJOYMENT! One student said the books were enjoyable because she could visualize the part and processes described by the author; her quote: "I feel really smart, and it's fun reading".

Presentation: Wednesday from 19:30 to 9:40

Location: Westport Room

26.

Title: Sanger Sequencing

Barbara Neureither

Objective: To help students understand how scientists sequence DNA.

Grade Levels: 9 10 11 12

Supplies: overhead projector

Description:

Sanger sequencing has become a very important tool when working with DNA. Our students need to understand this technology through a hands on activity even if we don't have the technology in our classroom to actually do the sequencing. I have developed a simulation involving pop beads which my students found helpful. It helped prevent some of the misconceptions they develop when they simply read a sequence off of a film.

In this simulation the students act as the enzyme, the pop beads are the nucleotides, altered pop beads are the dideoxys, and my lab tables become the electrophoresis chambers. After being given the DNA strand, the "enzymes" produce the complimentary strand with the "nucleotides" provided. They then load their strands into the appropriate well in the "electrophoresis gel" and separate them.

This activity is still in development so I would appreciate any feedback on how to improve it from any of the workshop participants.

Presentation: Thursday from 1:15 to 1:45

Location: McCoy Room

**27.** **Hope Nolen**  
Title: Investigating the Process and Products of the Human Genome and Recombinant DNA

Objective: To engage all high school students and teachers in an intensive, thematic short course.

Grade Levels: 9 10 11 12

**Description:**

From May 31 to June 3, Big Pine High School will concentrate all subjects in the study of the Human Genome and Recombinant DNA. We have had one all-day inservice to coordinate and begin our plans. We reviewed portions of the Secret of Life video series and other introductory video's, my Genome Workshop materials and books, and we discussed ways and means for each teacher to incorporate the materials and ideas. We have never done a thematic study before. At this time we are all planning and enveloping. So far, we plan to have mixed 9 - 12 student groups which rotate through all the disciplines the first two days for basic exposure. The last days will be by selection for an in-depth specific project, such as in art, drama, laboratory, etc. Big Pine is a very small school but hopefully some of our efforts will be applicable. I will make files and keep lessons plans to bring with me to Kansas City.

*Presentation: Thursday from 12:55 to 1:15*

*Location: Stanfords*

**28.** **Hope Nolen**  
Title: Crossing Over Kit

**Description:**

Discussion of classroom use of this hands-on kit from Ward's.

*Presentation: Tuesday from 8:00 to 8:15*

*Location: Westport Room*

**29.** **Butch Schmidt**  
Title: Student Exchange of Genetic Materials to Examine Results

Objective: To understand the chances in heredity and the ethics of genetic testing.

Grade Levels: 9 10 11 12

**Description:**

The students exchange paper genetic materials in class and then determine the characteristics of their children. They first establish their own genotypes. Then the question is: Should their children's characteristics be available to a public domain database? Employers? Police? Insurance companies? Etc.

*Presentation: Thursday from 4:00 to 4:10*

*Location: Hotel Lounge*



**30. Barbara Silber**

**Title:** Using Online Mendelian Genetics in Man (OMIM) to Research Human Genetic Diseases

**Objective:** To enable students to use this data base for source material on human genetic conditions and diseases.

**Grade Levels:** 11 12                      **Supplies:** Computer with modem and welcome program for Telenet access. Access to OMIM

**Description:**

The basic assignment is for the students to research and gather information about a human genetic condition of their choice prior to writing a report and/or making a presentation to the class. Since this data base is a full listing of the known genetic diseases the student's choice is not restricted.

*Presentation: Thursday from 4:10 to 4:20                      Location: Hotel Lounge*

**31. Gary Slaybaugh**

**Title:** Using the FCCSET computer capture system.

**Objective:** To provide photographic quality color 8X11" prints to enhance classroom presentations.

**Grade Levels:** 10 11 12

**Description:**

The computer generated FCCSET capture system and Adobe Printshop program were used to provide students with high resolution color prints to use as a guide for making drawings for their Histology Notebook. This process was also used to capture and print pictures from videotape. These pictures included fertilized devedeny sea urchin eggs and animated drawings from commercial quality programs dealing with biochemistry. The latter will be used to make xerox copies for students to write on as they take notes, while watching the same commercial tapes.

*Presentation: Wednesday from 9:55 to 10:10                      Location: Westport Room*

**32. Chuck Smith**

**Title:** Meiosis Chromosome Phenomena Demonstration Set

**Description:**

Discussion of classroom use of this hands-on kit from Ward's.

*Presentation: Tuesday from 7:45 to 8:00                      Location: Westport Room*

**Chuck Smith**

**33.**

Title: Meiosis

Objective: To show how chromosome count goes from diploid to monoploid during meiosis.

Grade Levels: 9 10 11

Description:

Using 4 strands yarn pieces representing chromosomes, students show replications during the S phase, reduction during anaphase I, and single thread chromosome, formation during anaphase II. Students imagine their desks are cells. They physically manipulate the chromosome threads through each of the phases. I would take enough cut yarn pieces for the activity so each teacher can go through the process.

*Presentation: Wednesday from 4:25 to 4:45*

*Location: McCoy Room*

**34.**

**Susan Talkmitt**

Title: Model for Teaching: Concept Attainment

Objective: To enhance student learning of concepts taught.

Source: Strategies for Teaching, Gerald Shoog, Texas Tech University, College of Education

Grade Levels: 7 8 9 10 11 12 U      Supplies: masking tape, open wall or board for presentation

Description:

This model allows students to use critical thinking skills to derive a concept taught through the use of "yes" and "no" examples. If they derive the concept, they have a better understanding because of the rules they established in developing the concept.

*Presentation: Thursday from 1:45 to 2:00*

*Location: McCoy Room*

**35.**

**Don Tatge**

Title: Paper Clip Set

Description:

Discussion of classroom use of this hands-on kit from Ward's.

*Presentation: Tuesday from 7:30 to 7:45*

*Location: Westport Room*

**Penny Wolkow**

**36.**

**Title:** Quantifying DNA

**Objective:** To determine the purity and measure the amount of isolated DNA using spectrophotometry.

**Source:** Ilya Goldberg, Department of Cell Biology, Johns Hopkins University

**Grade Levels:** 10 11 12      **Supplies:** spectrophotometer with ultraviolet capability

**Description:**

Extracting DNA from E coli or onion or yeast is a satisfying experience, but a way to measure what has been extracted would increase the relevance of this lab, especially for upper level students. DNA previously isolated by students from cells of your choice can be held in freezer until you are ready to quantify. Warm up spectrophotometer. Zero in pure water. Dilute your DNA sample to about 200x. Measure at OD260 and OD280. Calculate the amount of DNA extracted. DNA at 50 ug/ml has OD260 - 1.0. Determine the relative purity of the sample. Pure DNA in water has OD260/OD280 = 1.7 - 2.0. After obtaining their optical density measurements, the students can use the relationships above to calculate quantity and relative purity as a concluding exercise in isolation of DNA.

*Presentation: Thursday from 1:15 to 1:30*

*Location: Stanfords*

**37.**

**Title:** Sickle Cell Anemia Chance Inheritance Kit

**Penny Wolkow**

**Description:**

Discussion of classroom use of this hands-on kit from Ward's.

*Presentation: Tuesday from 7:15 to 7:30*

*Location: Westport Room*

**38.**

**Title:** Human Genome Activity

**Sharon Zupo**

**Description:**

Discussion of classroom use of this hands-on kit from Ward's.

*Presentation: Tuesday from 7:00 to 7:15*

*Location: Westport Room*

**39.**

**Title:** Three original genetic labs to enhance students' interest.

**Sharon Zupo**

**Objective:** The application of genetic concepts.

**Grade Levels:** 10 11 12      **Supplies:** overhead

**Description:**

1. Using the Portland Trailblazers for student-created models of polygenic inheritance.
2. DNA: the notes to the songs of life: a paper lab for protein synthesis
3. Mutant olympians: a mutation lab incorporating a school logo.

*Presentation: Wednesday from 4:45 to 5:00*

*Location: McCoy Room*

## MENTORS Genetic Resource Specialists

**The following professionals have agreed to collaborate with science educators participating in the HGP/DOE workshop: *Genetics Education for Middle and Secondary Science Teachers***

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Genetic Counselor

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Pediatrics / Human Development  
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**Terri Woodworth, M.D.**  
Geneticist

VCU/Medical College of Virginia Station  
Institute of Biotechnology Center for Innovative  
Technology, P.O. Box 126  
Richmond, VA 23298-0126

**Eric A. Wulfsberg, M.D.**  
Associate Professor

University of Maryland Medical School  
Genetics Division, Pediatrics  
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Baltimore, MD 21201

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**Tom Zinnen, Ph.D.**  
Biotechnologist

University of Wisconsin  
Madison, WI

## **COLLABORATIONS BETWEEN MENTORS AND PARTICIPANTS**

### **HGP / DOE Project Genetics Education for Middle and Secondary Science Teachers**

#### **Mentor by State**

#### **Ways They Collaborated**

##### **ALABAMA**

Virginia Proud  
Pediatric Geneticist  
University of Alabama  
Birmingham, AL

Spent 4 hours talking genetics. She provided slides for a presentation.

##### **ARKANSAS**

Becky Butler, M.S.  
Genetic Counselor  
Arkansas Genetics Program  
Little Rock, AR

Collaborated with teacher to present workshops in the summer.

##### **ARIZONA**

Tim Bowden, Ph.D.  
Cancer Researcher  
Arizona Cancer Center  
Tucson, AZ

Will present cancer and genetics information to students or teachers.

##### **CONNECTICUT**

Lynn Duchan, M.S.  
Genetic Counselor

Gave presentations to educators classes about human genetics and genetic conditions.

##### **FLORIDA**

Troy A. Becker, M.S.  
Genetic Counselor  
University of Florida  
Health Science Center  
Gainesville, FL

- Provided case examples of genetic counseling for classroom use.
- Made initial contact about requests for expertise, assistance with acquiring resources, and the availability of speakers for groups.

Persis C. Coleman, Ph.D.  
Genetic Counselor, Professor  
Rollins College  
Winter Park, FL

Made initial contact about requests for expertise, assistance with acquiring resources, and availability of speakers for groups.

Ronald L. Haun, M.D.  
Pediatric Clinical Geneticist  
Univ of Miami School of Medicine  
Miami, FL

- Contacted individuals from the March of Dimes to acquire current resource materials for students.
- Made initial contact about requests for expertise, assistance with acquiring resources, and availability of speakers for groups.

Maxine Sutcliffe, Ph.D.  
Director of Cytogenetics  
University of South Florida  
Dept of Pediatrics  
Tampa, FL

Made initial contact about requests for expertise, assistance with acquiring resources, and availability of speakers for groups.

Helen Travers, M.S.  
Genetic Counselor  
Miami, FL

Made initial contact about requests for expertise, assistance with acquiring resources, and availability of speakers for groups.

## ILLINOIS

Monica Barth, M.S.  
Genetic Counselor  
Northwestern University Medical  
Chicago, IL

Presented to students the Northwestern Program requirements to be a genetic counselor.

George Kieffer  
Genetics Professor  
University of Illinois  
at Urbana-Champaign  
Urbana, IL

- Spoke and gave slide presentation to classes on genetic engineering and biotechnology, new reproductive technology, embryology, cancer, DNA fingerprinting, etc.
- Working with educator on the development of an NCSA Mosaic document for life science teachers. This document will serve as an easy to use interface allowing individuals access to current information dealing with the Human Genome Project, using any computer connected to the internet.

Robert Roger Lebel, M.D.  
Geneticist  
Elmhurst, IL

Gave a 2 hour in-school presentation to advanced biology students.

Seth Marcus, M.S.  
Genetic Counselor  
Loyola Medical Center  
Maywood, IL

Gave lectures, and organized and moderated patient panels during human genetics program.

John Olis  
consumer  
Hoffman Estates, IL

Spoke during family panel about his heart transplant and why people should be organ donors.

Scott Polzin, M.S.  
Genetic Counselor  
Loyola Medical Center  
Maywood, IL

Gave lectures, and moderated patient panels during human genetics program.



Joan Shepard  
Laboratory Technician  
Illinois Kidney Foundation  
Histocompatibility Lab  
Regional Organ Bank of Illinois  
Chicago, IL

Showed a new kidney transplant video to students.  
Assisted with contacting a possible speaker for the classroom who has had an organ transplant.

Connie Smith  
Public Relations Director  
National Kidney Foundation  
Illinois Organ Bank  
Chicago, IL

- Helped organize a panel of individuals who have received a kidney transplant. Lead a discussion on organ donation and previewed a new National Kidney Foundation video.
- Moderated panel discussion that included individuals who have donated or received kidneys.

Joellyn Taylor, M.S.  
Genetic Counselor  
Loyola Medical Center  
Department of Pediatrics  
Maywood, IL

- Gave slide presentation on Mendelian inheritance. Gave scenarios of the roles a genetic counselor plays in various family situations.
- Presented two sessions: gave an introduction to genetic disorders, then gave several case studies.
- Presented an overview of genetic disorders and presented real case studies of patients for students to "solve" problems.

Joel Weiner  
Ph.D. Candidate, Molecular Biology  
University of Illinois  
Chicago, IL

- Presented current research in isolating the gene for muscular contraction in the euglena.
- Presented current study in molecular biology to students.

Lorraine Willmot  
Public Relations Director  
Regional Organ Bank of Illinois  
Chicago, IL

- Showed students a new kidney transplant video and discussed histocompatibility lab work. Assisted in contacting a possible speaker who has had an organ transplant.
- Worked with National Kidney Foundation to provide panel participants.
- Helped organize a panel of individuals who have kidney transplants. Lead a discussion on organ donation and previewed a new National Kidney Foundation video.

## INDIANA

Jon Hendrix, Ph.D.  
Genetics Educator  
Ball State University  
Muncie, IN

Provided materials, and expertise at a Houston workshop.

## KANSAS

Debra L. Collins, M.S.  
Genetic Counselor  
Genetics Education Center  
University of Kansas Medical Center  
Kansas City, KS

Provided answers to students questions about human genetics and the Human Genome Project.

Lenna Levitch, M.S.  
Genetic Counselor  
OB/GYN Department  
University of Kansas Medical Center  
Kansas City, KS

Assisted with mentorship program as part of Human Genetics Magnet pilot program, Olathe South High School.

Bill Limes  
Science Instructor  
Olathe South High School  
Olathe, KS

Shared materials and ideas for future classes.

## KENTUCKY

Peggy Richards, Ph.D.  
Professor  
Centre College

Collaborated as a resource person to teacher and her students.

## MARYLAND

Corinne Baehm  
Director  
Johns Hopkins  
DNA Diagnostic Laboratory  
Baltimore, MD

- Was a speaker during a "Human Genetics and DNA Diagnosis" presentation at Maryland Science teachers Association Convention, Columbia, MD.
- Spoke during a joint presentation with educator at sessions featuring the Human Genome Project and the Johns Hopkins DNA testing program at teachers' conference.

Brenda Gerwin, Ph.D.  
Researcher  
National Institutes of Health  
Bethesda, MD

Acted as a mentor to me for 6 weeks when I worked in her lab.

Robert Farrell, Ph.D.  
President  
Exon-Intron Inc.  
Columbia, MD

Worked with county schools in biotechnology education. He provided suggestions, materials and training in recombinant DNA methods.

Louise Paguin, Ph.D.  
Professor  
Western Maryland College  
Westminister, MD

Worked with educator to develop presentations for HGP workshops.

## **MAINE**

Ed Kloza, M.S.  
Genetic Counselor  
Foundation for Blood Research  
Scarborough, ME

Spoke to class about careers in genetic counseling, and discussed the implications of the Human Genome Project in the field of clinical genetics.

## **MICHIGAN**

Janice Bach, M.S.  
Genetic Counselor  
Michigan Dept of Public Health  
Lansing, MI

Assisted with the planning of a genetics workshop for March 19th, 1994.

Diane Baker, M.S.  
Genetic Counselor  
University of Michigan  
Ann Arbor, MI

- Was guest speaker to 110 high school students on "Genetic Fingerprinting" and "Advances in Genetics and the HGP".
- Spoke at Teaching Inservice about human genetics.

## **MINNESOTA**

Bonnie LeRoy

Arranged lab visits and internships in numerous labs for students, including the lab that recently identified the ataxia gene in Minnesota. One of the students did a 6 week internship at the Molecular Diagnostics Lab in human genetics.

## **MISSOURI**

Rosemary Flannigan, Ph.D.  
Ethicist  
Mid-West Bioethics Center  
Kansas City, MO

Lectured on "What Is Ethics and What Is It Not" for Genetics Magnet Program classes.

Linda Pasztor, Ph.D.  
Cytogeneticist  
Children's Mercy Hospital  
Cytogenetics Lab  
Kansas City, MO

Assisted with mentorship program for Human Genetics Magnet pilot programs at Olathe South High School.

Lori Williamson-Kruse, M.S.  
Genetic Counselor  
University of Missouri Hospital  
Columbia, MO

Answered students' questions concerning genetic diseases.

## **NEBRASKA**

Amy Browder  
Boys Town Nat'l Research Hospital  
Department of Genetics  
Omaha, NE

Provided lab tours of facilities and spoke on genetic research at the institute.

Shelley Smith, Ph.D.  
Medical Geneticist  
Boys Town Nat'l Research Hospital  
Department of Genetics  
Omaha, NE

Gave presentation to North Platte Catholic School students during Career Awareness day.

Sue Tinley, R.N.  
Genetic Nurse Specialist  
Boys Town Nat'l Research Hospital  
Department of Genetics  
Omaha, NE

- Coordinated a speaker from the institute.
- Gave access for clinical laboratory tour.

### **NEW HAMPSHIRE**

Sabash Minocha, Ph.D.  
Professor  
University of New Hampshire

Provided materials for labs: DWP, enzymes, etc.

### **NEW MEXICO**

Lori Ballinger, M.S.  
Genetic Counselor  
Mental Health Program  
Albuquerque, NM

Initial contact was made.

Teresa Castellano, M.S.  
Genetic Counselor  
Department of Obstetrics  
University of New Mexico Hospital  
Albuquerque, NM

Has had an initial conversation and will provide a lot of stuff resources.

### **OREGON**

Karen Kovac, M.S.  
Genetic Counselor  
CDRC Oregon Health Sciences  
University of Washington

Spoke to classes about genetics, counseling and disorders.

Jay Nead, M.D.  
Medical Geneticist  
American Red Cross  
Portland, OR

- Conducted tour through the molecular genetics laboratory for students.
- Visited classroom to show students how paternity testing is done.

### **PENNSYLVANIA**

Bea Leopold  
National Society of Genetic  
Counselors  
Wallingford, PA

Provided high school students with a career packet on genetic counseling.

## **RHODE ISLAND**

Robert Krasner, Ph.D.  
Professor of Biology  
Providence College  
Providence, RI

Worked with educator as the director of biotechnology projects at Providence College.

## **SOUTH DAKOTA**

Carol Strom, M.S.  
Genetic Counselor  
Rapid City, SD

- Spoke to physiology and anatomy classes 1st and 2nd semesters (75 students total) about birth defects, bioethical decisions.
- Educator then introduced her to a colleague who in turn had her speak to his biology class.

## **TEXAS**

Michael Brown, M.D.  
Nobel Prize Laureate  
Southwest Medical Center Parkland  
Dallas, TX

Presented during the Awards STAR Programs.

Heather Stieglitz  
Biology Researcher  
Dallas, TX

Demonstrated and assisted students during Living Materials Center Workshops.

## **VIRGINIA**

Don Ball, Ph.D.  
Microbiologist and Biotechnologist  
Biotechnology Center  
VPI & State University  
Blacksburg, VA

- Was on planning committee to organize 2 workshops in July, 1994 for Virginia teachers which last for 1 week and include lab activities, lectures, and visits to biotechnology labs.
- Assisted educator in networking with genetic professionals in her state.

Toby Horn, Ph.D.  
Biotechnologist  
Thomas Jefferson Magnet School  
for Science  
Springfield, VA

Helped organize a teacher inservice of human genetics and biotechnology.

Tracy Wilkins, Ph.D.  
Microbiologist and Biotechnologist  
Biotechnology Center  
VPI & State University  
Blacksburg, VA

- Was on planning committee to organized 2 workshops in July, 1994 for Virginia teachers which last for 1 week and include lab activities, lectures and visits to biotechnology labs.
- As director of the new Center for Biotechnology, is assisting educator in networking with genetic professionals in the state.

Terri Woodworth, M.D., Ph.D.  
Geneticist, Center Director  
Biotechnology Center  
for Innovative Technology  
Medical Center of Virginia  
Richmond, VA

- Served on a State Education Committee which formulates new ideas for serving teachers.
- Collaborated with teacher as a member of the State Biotechnology Committee that he has started this year.

#### **WASHINGTON**

Robin Bennett, M.S.  
Genetic Counselor  
University of Washington  
Genetic Counselor Services

Did committee work for PacNoRGG.

Joe Clark  
CEO Videodiscovery  
Seattle, WA

Directed a design team who created Genetics Videodiscs titled "Genetics Today".

#### **WISCONSIN**

Tom Zinnen, Ph.D.  
Biotechnologist  
University of Wisconsin  
Madison, WI

Providing information on project he directs: BCEPP, a new computer networking system for biotechnology.

**DISSEMINATION AND NETWORKING**  
**by Teacher / Participants of HGP / DOE Project:**  
**Genetics Education for Middle and Secondary Science Teachers**

**NEW YORK STATE REGION**

Leo J. Palmero

- *BSCS Mapping and Sequencing the Human Genome: Science, Ethics and Public Policy curriculum's Nathaniel Wu Activity Debate between A.P. Biology class and English Honors class with social studies teacher moderation*, North Rockland High School, Thiells, NY O
- *Biotechnology Awareness Week*, Toronto, Ontario P

**GREAT LAKES REGION**

(Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin)

Linda S. Davis

- *Human Genome Project Information* to biology teachers from districts of Palatine, IL O,P
- *Human Genetics Inservice* with Science Department, Hoffman Estates High School, Hoffman Estates, IL P
- *Genetic Debate Simulation for High School Students*, National Association of Biology Teachers National Convention, St. Louis, MO P
- *Introduction to Gel Electrophoresis for Teachers*, Orland Park school district in conjunction with Sargent-Welsh and Edvotek, Orland Park, IL O,P

Rochelle S. Epperson

- *Human Genetics Workshop* with \$1800 grant from GLaRGG, Urbana, IL O,P

David D. Glenn

- *Genetics in the 90's*, Michigan Science Teachers Association Annual Convention, Detroit, MI A

Alan D. Hoffmann

- *Human Genome Project Presentation*, Illinois Science Teacher Conference, Collinsville, IL O,P
- *Human Genome Project Presentation*, Hope College Science Day, Holland, MI O,P
- *Making Human Genetics Real: Bring in a Genetic Counselor*, National Association of Biology Teachers Convention, St. Louis, MO P

Peggy Keeling

- *Human Genetics and the Human Genome Project* workshop, Minneapolis, MN O,P

Linda Levely

- *BSCS Mapping and Sequencing the Human Genome: Science, Ethics and Public Policy Laboratory Activities*, Metro Detroit Science Teachers Association, Detroit, MI P
- *Mapping and Sequencing The Human Genome: Science, Ethics and Public Policy (BSCS) Activities 1 and 2*, Metropolitan Detroit Science Teachers Association Convention, Plymouth, MI P
- *Update on the Human Genome Project*, Metropolitan Detroit Science Teachers Association Convention, Plymouth, MI P
- *BSCS Activity 1 Genetics Workshop*, Madison Heights, MI O,P
- *Teaching Human Genetics and the Human Genome Project* workshop Bishop Foley High School, Madison Heights, MI O,P

**KEY TO RIGHT COLUMN**

A = Attended

O = Organized

P = Presented

### Gordon Mendenhall

- *Pedigree and Probability*, National Association of Biology Teachers, Denver, CO P
- *Partnership in Teaching Genome Technology*, National Genome Center, University of Michigan Education Program, Ann Arbor, MI P
- *Teaching the New Genetics: An Update for Educators*, Genetics Center of Children's Hospital Medical Center, Akron, OH P
- *Human Genetics*, GLaRGG Meeting, GLaRGG Regional Conference, Indianapolis, IN A
- *Population Genetics Made Easy*, NABT National Conference, Boston, MA P
- *Genethics Reunion Meeting*, NABT National Conference, Boston, MA P
- *Revisit to the Tragedy of the Commons*, Wingspread Conference, Racine, WI A
- *Genetics Teaching Materials Project*, Indiana School for the Blind, Indianapolis, IN O
- *Population Genetics Made Easy*, Housier Association of Science Teachers, Indianapolis, IN P
- *Human Genetics Pre-service Special Education Undergraduate Course*, Spring Semester, Bio 453/553 Ball State University, Muncie, IN O,P

### Kristi Slaby

- *Bioethics and the Human Genome*, Indianapolis, IN P
- *Bioethics*, NABT National Convention, Boston, MA P
- *Update on the Human Genome Project*, Kankekee Valley High School, Wheatfield, IN P

### Gary Owen Slaybaugh

- *DNA: The Double Helix, Forty Years: Perspective and Prospective* including presentations by 10 nobel laureates, The New York Academy of Science's Conference on DNA, Chicago, IL A
- *Howard Hughes' Biotechnology and Genetic Engineering Course II*, Dr. George Kieffer, professor, University of Illinois Circle Campus, Chicago, IL A

### David M. Stone

- *Human Genetics Workshop* from \$1800 grant from GLaRGG, Urbana, IL O,P
- *Bioethics Workshop*, University of Illinois, Urbana-Champaign, Urbana, IL A
- *Bioethics Curriculum Development Workshop*, University of Urbana-Champaign, Urbana, IL P

## Great Plains Region

(Arkansas, Iowa, Kansas, Missouri, Nebraska, Oklahoma, North Dakota, South Dakota)

### Rebecca L. Ayers-Knetter

- *Update on the Human Genome Project*, National Association of Biology Teachers Convention, St. Louis, MO P

### Keith Barnes

- *Magnet Program on Human Genetics and Biotechnology*, Olathe School District, Olathe, KS O,P
- *HGP: Genome Technology and Its Implications*, University of Michigan, NIH Human Genome Center, Ann Arbor, MI A

### Mary Buehrer

- *Magnet Program on Human Genetics and Biotechnology*, Olathe School District, Olathe, KS O,P

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### Richard G. Dawson

- *Genetics Issues in the Future*, futurist worksheet, National Association of Biology Teachers National Convention, Boston, MA P
- *Woodrow Wilson Bioethics Presentation*, National Association of Biology Teachers National Convention, Boston, MA P
- *Bioethics Education Workshops*, Rockhurst College, Kansas City, MO O,P
- *Human Genetics Issues in the Future* presentation of futurist worksheet, National Science Teachers Association National Convention, Anaheim, CA P
- *Woodrow Wilson Bioethics Presentation*, National Science Teachers Association National Convention, Anaheim, CA P
- *Medical Ethics and Genetics Issues*, Bragg Symposium on Humanism, Kansas City, MO P
- *Bioethics and the Human Genome Project*, KATS Kamp, Junction City, KS P
- *Workshop on Bioethics Materials*, Rockhurst College, Kansas City, MO O,P

### Ronald R. Fahy

- *Native American Genetics Curriculum Pilot Project Presentations* by Carol Strom, Genetic Counselor, South Dakota Science Teachers Association, Huron, SD A
- *Argentina's Disappeared and Mitochondrial DNA Testing*, Joint Conference on the Teaching of Undergraduate Mathematics and Science, Huron, SD P
- *Argentina Disappeared Presentation on Mitochondrial DNA Testing and the Human Genome Project*, South Dakota Science Teachers Association and South Dakota Council of Teachers of Math Joint, Conference, Huron, SD P

### Peggy Jane Farmer

- *Developments in Genetics*, Junior College Course session, Hermitage, MO P

### Becky Goodwin

- *The Human Genome Project* Presentation to High School Students, Kansas School for the Deaf, Olathe, KS O,P
- *Human Genetics and the Human Genome Project* planning session with public school teachers for 1994 school year involvement in cooperative learning, Kansas School for the Deaf, Olathe, KS A
- *The Human Genome Project* Inservice for School Staff, Kansas School for the Deaf, Olathe, KS O,P
- *Discussions on the Human Genome Project and Teaching Human Genetics* KATS Kamp, Rock Springs, AR A

### Susan B. Koba

- *Genetic Lab Options for Teachers*, Bryan Senior High School, Omaha, NE O,P
- *Academic Decathlon Competition on Biotechnology* development committee in conjunction with two teachers and three students, Omaha, NE O,P
- *Why Do You Have Your Grandmother's Nose* curriculum presentation, Nebraska Association of Science Teachers Fall Conference, Fremont, NE O,P
- *Why Do You Have Your Grandmother's Nose* curriculum presentation, NSTA National Convention, Anaheim, CA O,P
- *Genetics and the Human Genome Project* during the K-12 project (SSI) to teachers and Upward Bound students, Lincoln, NE O,P
- *4 Hour Class on Genetics during Biology 101: Elementary Science Education*, University of Nebraska, Lincoln, NE O,P

### William E. Limes, Jr.

- *Human Genome Project Workshop*, University of Michigan, Ann Arbor, MI A
- *Missouri Regional Conference on Genetic Disorders*, Tan Tara Lodge, Osage Beach, MO A
- *Magnet Program on Human Genetics and Biotechnology*, Olathe School District, Olathe, KS O,P

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**Carole McRight**

- *Human Genome Project Information*, Northwest Arkansas Math and Science Alliance, Springdale, AR P
- *Basics of the Human Genome Project*, Springfield High School, Springfield, AR O,P

**K. Sara Morris**

- *Romeo and Juliet Genetics Activity*, State Science Teacher's Retreat, Norfolk, NE P
- *Information on Human Genome Project* small group discussion, State Science Teacher's Retreat, Norfolk, NE P
- *Update on Genetics*, Nebraska Association of Teachers of Science, Fremont, NE A
- *Genetics and Ethics: Overview of the Human Genome Project*, Great Plain's Medical Center Ethics Committee, North Platte, NE P
- *Board Member of Bioethics / Genetics section*, Policy Board for the Western Regional Math and Science Coalition, North Platte, NE P
- *Los Desaparecidos* as part of Multicultural Awareness Week, Spanish Classes, North Platt Catholic Schools, North Platte, NE P
- *Legal and Social Issues: Bioethics*, Nebraska Association of Teachers of Science, Fremont, NE P

**Linda J. Morris**

- *Intergenerational Ethics Program*, Denver Metro High School Ethics Consortium, Denver, CA P

**Brad Williamson**

- *Search Genetic Databases*, Genetics Education Workshops for Middle and High School Science Teachers, Kansas City, KS P

**MID-ATLANTIC REGION**

**(Delaware, District of Columbia, Maryland, New Jersey, Pennsylvania, Virginia, West Virginia)**

**Helen Ann Griech**

- *Students and Researchers Interaction Session*, Fox Chase Cancer Center, Philadelphia, PA O
- *One Day Student Interaction Session with Genetics Researchers*, Fox Chase Cancer Center, Philadelphia, PA O
- *The New Genetics*, EIRC, Sewell, NJ A
- *Human Genetics and the Human Genome Project*, Burlington Rotary Club, Burlington, NJ O,P
- *Human Genetics and the Human Genome Project*, The New Jersey Association of Independent Schools, NJ P
- *The New Genetics In Revolutionizing Your World*, Cornell Institute Medical Research program, College of Physicians of Philadelphia, PA A
- *Introduction to the Human Genome Project*, Burlington Rotary Club, Burlington, NJ P
- *Bioethics Curriculum Writing Session* with the NJSSA to develop new case studies for use in the classroom, Roche Institute of Molecular Biology, Nutley, NJ P
- *Resource Person For Human Genetics Educational Materials*, sent articles to New Jersey Science Teacher's Bulletin posting availability O

**Rebecca E. Ross**

- *The Human Genome Project: An Update*, Virginia Association of Science Teachers State Convention, Williamsburg, VA P
- *DNA Plasmid Mapping Techniques* workshop, Virginia Association of Science Teachers State Convention, Williamsburg, VA P
- *The Human Genome Project* education session, Virginia Association of Science Teachers State Meeting, Williamsburg, VA O,P
- *Plasmid Mapping*, Virginia Science Teachers Association State Convention, Williamsburg, VA O,P
- *National Biotechnology Education Convention*, University of Wisconsin, Madison, WI A
- *Workshop on the Human Genome Project*, Roanoke County, Roanoke, VA O,P
- *The Human Genome Project* inservice to Roanoke city and Roanoke county teachers, Roanoke, VA O,P

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- *Workshop on the Human Genome Project*, Roanoke City Schools, Roanoke, VA O,P
- *Human Genetics and the Human Genome Project* meeting for teachers, Thomas Jefferson Magnet School, Springfield, VA O
- *The Human Genome Project*, State V-Quest Group, Roanoke, VA O,P
- *State Biotechnology Education Committee Meeting on Human Genetics Educational Ideas for State Curriculum*, Fishersville, VA O
- *Coordinator of Full Day Biotechnology Laboratory Activity Session* for State VAST Convention, November, 1995, Blacksburg, VA O
- *DNA and Proteins Workshops for Teachers*, V.P.I. and State University, Blacksburg, VA O

#### Penny Wolkow

- *Tech Prep Program for High School and Community College Students*, Howard County, MD O
- *Curriculum Writing Workshop* New curriculum being developed for Tech Prep Program, Howard County Public Schools, Columbia, MD O,P
- *DNA Isolation Procedure*, Howard County Public School, Columbia, MD P
- *Update on Recombinant DNA Technology for Teachers*, Partnership Conference for Maryland Businesses and Educators, Liuthieum, MD P
- *Human Genetics and DNA Diagnosis*, Maryland Science Teachers Association Convention, Columbia, MD O,P

### MOUNTAIN STATE REGION

(Arizona, Colorado, Montana, New Mexico, Utah, Wyoming)

#### Jonathan M. Bealer

- *Human Genetics and Bioethical Decision Making*, Spring, TX O,P
- *BSCS Mapping and Sequencing the Human Genome: Science, Ethics and Public Policy Activity 2* Genetics Workshop for the Unified Schools of Buckeye, Arizona, Buckeye, AZ P
- *Bioethical Decision Making*, Genetics Workshop for the Unified Schools of Buckeye, Arizona, Buckeye, AZ P
- *Human Genetics and Bioethical Decision Making*, Houston Texas in Conjunction with Ball State, University, Houston, TX P
- *BSCS Mapping and Sequencing the Human Genome: Science, Ethics and Public Policy Curriculum: Understanding the Social and Scientific Implications*, Buena High School Social Studies Department, Sierra Vista, AZ P
- *Human Genome Project Information for Social Studies Teachers*, Sierra Vista, AZ O,P
- *Human Genome Activities for Bioethics*, Buckeye, AZ O,P
- *Health Careers Workshop*, Sierra Vista High School, Sierra Vista, AZ O

#### Robert Cefalo

- *Cold Spring Harbor DNA Science Workshop*, University of Utah, Salt Lake City, UT A
- *Human Genetics and the Human Genome Project* Secondary Science Teacher Inservice, Box Elder School District, Brigham City, UT O,P

#### Bruce Miller

- *Interactive Computer Software for Learning the Basics of Mendelian and Human genetics, and the Nature and Function of DNA and RNA*, La Cueva High School, Albuquerque, NM O,P

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## NEW ENGLAND REGION

(Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont)

Sheryl B. Dominic

- *Mapping and Sequencing the Human Genome: BSCS Activities Demonstration*, Rockland, ME P

Maureen Floor

- *BSCS Mapping and Sequencing the Human Genome: Science, Ethics and Public Policy Activities 2 and 3*, Providence College Biotechnology Workshop, Greenville, RI P
- *An Overview of the Human Genome Project: The Interdisciplinary Nature of Genetics and Bioethics for Social Studies and Biology Teachers*, Lincoln Junior-Senior High School, Lincoln, RI O,P
- *Human Genome Project: An Overview Activities* for pre-college students, Providence College, Providence, RI P
- *The Human Genome Project: A Model for Interdisciplinary Studies*, Rhode Island College, Providence, RI P

Susan M. Lamos

- *Update on the Human Genome Project*, New Hampshire Science Teachers Association Annual Convention, Nashua, NH P

Mary Carroll McCaffrey

- *Human Genome Project BSCS Materials*, Montgomery County, PA P
- *Human Genome Project BSCS Materials*, Delaware Valley of Pennsylvania and New Jersey, Delaware Valley, PA P
- *Human Genome Project BSCS Materials*, NABT National Convention, Boston, MA P

## PACIFIC NORTHWEST REGION (Alaska, Idaho, Oregon, Washington)

Marlys I. McCurdy

- *Recipient of PacNoRGG Grant for Human Genetics Inservices for 20 Secondary Science Educators in Idaho*, 1994 Idaho Science Teachers Convention, Pocatello, ID O

Butch Schmidt

- *Update on the Human Genome Project*, Wrangell School District, Wrangell, AK O,P
- *Update on the Human Genome Project*, Wrangell School District, Wrangell, AK O,P

Chuck Smith

- *Overview of HGP Materials and BSCS Activity 1*, Vancouver, WA P
- *Human Genome Project Update for Teachers*, Hewlett-Packard Corporation, Vancouver, WA O,P
- *Human Genome Project Update for Teachers*, Hewlett-Packard Corporation, Vancouver, WA O,P
- *Human Genome Project Update for Teachers*, PacNoRGG Regional Meeting, Portland, OR O,P
- *Human Genome Project: Curriculum Materials and Activities*, S.M.A.R.T.: Science and Math Advancement Reachout for Teachers, Vancouver, WA P
- *Human Genome Project Update for Teachers*, Lake Osawego High School, Lake Osawego, WA O,P
- *Human Genome Project Update for Teachers*, Willamette High School, Eugene, OR O,P
- *Review of BSCS Activity 2 and Chances' Choices Activities*, Vancouver, WA P
- *Human Genome Project Update*, Oregon Science Teachers Association meeting, OR P
- *Overview of the Human Genome Project and BSCS Activity 2*, Oregon Science Teachers Fall Conference, Eugene, OR P
- *Overview of the Human Genome Project, BSCS Activity 2 and Chances' Choices*, Vancouver, WA P
- *HGP and Chances Choices Workshop*, Vancouver, WA P
- *Human Genome Project Update for Teachers*, Hewlett-Packard Corporation, Vancouver, WA O,P
- *Human Genome Project Update for Teachers*, Hewlett-Packard Corporation, Vancouver, WA O,P

### KEY TO RIGHT COLUMN

A = Attended

O = Organized

P = Presented

**Sharon Zupo**

- *Introducing Bioethics Into The Classroom* assisted 3 WWNFF Teachers to lead a 1 week workshop, Chicago, IL P
- *Lesson Plans Presentation to the Ball State Network*, NABT National Conference, Boston, MA P
- *Forensic Workshop including DNA Fingerprinting Paper Lab Activity*, NABT National Convention, Boston, MA P
- *An Update on the Human Genome Project*, Oregon Science Teachers Association Inservice, Willamette High School, Eugene, OR P
- *Karyotypes and Inheritance of Chromosomes* presented with WWNFF module, Oregon Science Teachers Association State Inservice, Willamette High School, Eugene, OR P
- *Deciphering the Human Genome: A Coming Revolution in Biology and Medicine in the 21st Century* Distinguished Lecture Series by Dr. Leroy Hood, John's Hopkins, Cal Tech, Reed College, Portland, OR A

**PACIFIC SOUTHWEST REGION  
(California, Hawaii, Nevada)**

**Hope C. Nolen**

- *The Human Genome Project*, California Science Teachers Association, Los Angeles, CA A
- *Human Genetics and the Human Genome Project* teacher inservice, Big Pine High School, Big Pine, CA O,P

**Susan Sprouse**

- *Human Genetics Curricular Materials and Lesson Plans for Cooperative Learning Activities*, Beverly Hills High School Summer Workshop for Biology Teachers, Beverly Hills, CA O,P
- *Implications of the Human Genome Project*, California Science Teacher Association 3rd Annual Statewide Conference, Palm Springs, CA O,P

**SOUTHEAST REGION  
(Alabama, Florida, Georgia, Kentucky, Louisiana,  
Mississippi, North Carolina, South Carolina, Tennessee)**

**Cissy Bennett**

- *Presentation on Bioethics*, National Association of Biology Teachers, Boston, MA P
- *Human Genome Project*, State Medical Technology Students Meeting, Birmingham, AL P
- *Bioethics / Biotechnology Workshop for Secondary Teachers* (5 days), Paideia School, Atlanta, GA O,P
- *AP Biology Forum to Organize Bioethics Workshops*, University of Alabama, Birmingham, Alabama Science Teachers Meeting, Birmingham, AL O,P
- *Human Genome Project*, Alabama State Society Medical Technician State Meeting, Birmingham, AL O,P

**Margaret A. Hess**

- *A Presentation of Argentina's Lost*, Fernandina Beach High School Foundation, Fernandina Beach, FL P
- *Networking and Providing Genetics Materials to Teachers and Students*, Fernandina Beach, FL O
- *Inservice on How to Use BSCS Genetics Materials*, Fernandina Beach, FL P

**Arlene F. Johnson**

- *BSCS Unit: the Human Genome: Science, Ethics and Public Policy* workshop, Staples High School, Westport, CT O,P

**Vicki Lete**

- *Gel Electrophoresis Demonstration*, Jefferson County Biology Alliance, Louisville, KY O,P

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Carolyn Napier Martin

- *Woodrow Wilson Outreach on Biotechnology and Bioethics*, Many, LA O,P
- *Human Genome Project: ELSI Issues*, State Teacher Conference, LA P
- *Woodrow Wilson Outreach on Biotechnology and Bioethics*, Alexandria, LA O,P
- *Swinging on the Family Tree: How will the Human Genome Project Affect Us*, National Association of Biology Teachers, St. Louis, MO P

Daryl G. Miller, Ph.D.

- *Biotechnology and Granoma: A Potent Partnership for Human Rights*, Broward Community College, South, Phi Theta Kappa Lecture Series, Broward, FL P
- *Assist student editors in HGP feature columns in "Gray Matters" science newsletter*, Broward County Public Schools, Pembroke Pines, FL O
- *Genetics and the HGP: Hands-on Lessons*, Pembroke Pines and Holloywood schools, Pembroke Pines, FL O,P
- *Genes R Us: Science 4 Kids* programs, Broward Community College, South, Broward, FL O,P

Mark A. Stallings

- *The Human Genome Project*, Georgia Science Teachers Association Area Meeting, Ellijay, GA P
- *The Human Genome Project*, Georgia Science Teachers Association Regional Science Inservice Day, Dahlonega, GA P
- *The Human Genome Project*, Georgia Science Teachers Association State Conference, Savannah, GA P

**TEXAS STATE REGION**

William Humphries

- *DNA Technology*, Richardson Living Materials Center, Richardson, TX P
- *DNA Technology*, Richardson School District, Richardson, TX P
- *Human Genome Project*, Association of Science Teachers Continuing Education Program, Austin, TX P
- *DNA Workshop*, Tyler Community College, Dallas, TX P

Audrey Martin-Henderson

- *Advances in Technology and Biotechnology*, Texas Association of Superintendents and School Boards, Austin, TX P

Grace McLeroy

- *TexGene Conference*, South Padra, TX A
- *New Wave Genetics*, Metroplex Science Educators, Dallas, TX P
- *Getting Genetics with the Genome*, Region 10 Science Conference, S. Garland High School, Garland, TX P
- *Fast Foods Genetics Workshop*, Garland Teacher Inservice, Garland, TX P
- *Human Genetics Teacher Inservice Training*, National Institutes of Health, Bethesda, MD A
- *Using Yeast to Study Genetics and Radiation Workshop* on Yeast, Kansas State University, Manhattan, KS A
- *Lesson Plans Development for DNA Activities*, presented on KERA-TV Master Teacher Program, Dallas, TX P
- *Getting Genetics with the Genome*, Conference for Association of Science Teachers (CAST), Austin, TX P

**KEY TO RIGHT COLUMN**

A = Attended

O = Organized

P = Presented

# The University of Kansas Medical Center

## DIVISION OF ENDOCRINOLOGY, METABOLISM AND GENETICS

School of Medicine  
Department of Internal Medicine

Genetic Counselor  
Debra L. Collins, M. S.

Staff  
R. Neil Schimke, M. D., Director  
Joseph L. Kyner, M. D.  
Barbara P. Lukert, M.D.  
Betty M. Drees, M.D.

Nurse Clinicians  
George Ann Eaks, R. N.  
Beth Lucasey, R. N.

May 1994

organization~  
address~  
city~, st~ zip~

Re: Genetic Conditions: Family Stories (a resource guide for teaching Human Genetics)

We are writing regarding a project to create a resource guide on genetic conditions called Genetic Conditions: Family Stories. The resource will be a booklet of stories and photographs (slides) of individuals and families affected by genetic conditions. This resource is intended to help educate the public, correct misconceptions, and increase understanding of the effects of genetic conditions/birth defects on individuals and families.

We would like to include a story about individuals with condition~ in the resource. From our experiences in teaching, we have found personal stories to be one of the most helpful ways to explain the impact of a genetic condition on an individual or family. Would you be willing to identify individuals who would be interested in sharing a letter or story about themselves or their family member for the guide?

We would like:

- **a short personal story** (one page) describing, for example, how the individual was first diagnosed and any misconceptions they find important to correct for the public. We are also interested in any aspects of their lives which will help others know and appreciate the unique and special qualities of individuals and families with this condition. When appropriate, we might add laboratory information (such as chromosome pictures) or supplemental materials.
- **a photograph of the individual or the family member** with this condition. Photographs of every day life situations are requested, rather than medical book poses.

**Please send the enclosed letter and consent form to an individual in your organization.**

The resource will be available to secondary science teachers as a genetics curriculum, genetic professionals, families and others. We intend for the resource to be used by educators to discuss these conditions in a more sensitive context rather than an impersonal textbook description. In the future, many individuals may have decisions to make regarding genetic testing. These decisions are rarely simple and straightforward. Through education, we can help prepare the public and health care providers for this future. Upon completion, we expect to distribute the resource at cost.

If you have any questions about this project, please feel free to contact us. We look forward to hearing from you.

Sincerely,

Debra L. Collins, M.S.  
Genetic Counselor

Enclosure: Family Letter, Consent Form

# The University of Kansas Medical Center

Appendix J  
DL Collins

## DIVISION OF ENDOCRINOLOGY, METABOLISM AND GENETICS

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George Ann Eaks, R. N.  
Beth Lucasey, R. N.

May 1994

Re: Genetic Conditions: Family Stories (a resource guide for teaching Human Genetics)

Dear Support Group Member:

We are writing to you regarding a project to create a resource guide on genetic conditions titled Genetic Conditions: Family Stories (a curriculum resource for teaching Human Genetics). The resource will be a booklet of stories and photographs (slides) of individuals and families affected by genetic conditions. This resource is intended to help educate the public, correct misconceptions, and increase understanding of the effects of genetic conditions/birth defects on individuals and families.

We would like to include a story about individuals with condition~ in the resource. From our experiences in teaching, we have found personal stories to be one of the most helpful ways of explaining the impact of a genetic condition on an individual or family. We are writing to ask if you would be willing to share. Would you be willing to share a letter or story about yourself or a family member for the guide.

We would like:

- **a short personal story** (one page) describing, for example, how the individual was first diagnosed and any misconceptions you find important to correct for the public. We are also interested in aspects of your lives which will help others know and appreciate the unique and special qualities of individuals and families with this condition. When appropriate, we will add laboratory information (such as chromosome pictures) or supplemental materials.
- **a photograph of you or your family member** with this condition. Photographs of every day life situations are requested, rather than medical book poses.

**Please fill out and return the enclosed consent form.**

The resource will be available to secondary science teachers as a genetics curriculum, genetic professionals, families and others. We intend for the resource to be used by educators to discuss these conditions in a more sensitive context rather than an impersonal textbook description. In the future, many individuals may have decisions to make regarding genetic testing. These decisions are rarely simple and straightforward. Through education, we can help prepare the public and health care providers for this future. Upon completion, we expect to distribute the resource at cost.

If you have any questions about this project, please feel free to contact us. We look forward to hearing from you.

Sincerely,

Debra L. Collins, M.S.  
Genetic Counselor

Enclosure: consent form



## FAMILY STORIES CONSENT FORM

Organization: \_\_\_\_\_ Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_ St: \_\_\_\_\_ Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_

I have submitted a story and/or photograph to The University of Kansas Medical Center about:

☐ my child

☐ myself

☐ a family member

with (condition): \_\_\_\_\_

I give my permission to the University of Kansas Medical Center for my story and/or photograph to be reproduced and published in Genetic Conditions: Family Stories (a curriculum guide for teaching Human Genetics). This resource guide will be copyrighted in the name of the University of Kansas Medical Center.

I understand that the publication will be available to educators, genetic professionals, families and others; however the publication may also be printed and distributed to a general audience.

I understand that the story and/or photograph is intended for educational purposes and will be available at cost; therefore I relinquish any financial reimbursement for the use of this story or photograph.

I understand and agree that the University of Kansas Medical Center may edit the material as necessary for inclusion in the publication.

Signed:

\_\_\_\_\_  
your name

\_\_\_\_\_  
association or affiliation name

\_\_\_\_\_  
Date



# *The Genetic Probe*



Volume 1 No.1 Fall 1993

## **WELCOME**

Welcome to the first edition of *The Genetic Probe*. It is our hope that this can be a vehicle for the exchange of ideas among educators and other professionals for the furthering of education of students in genetics and the implications to society.

The *Probe* cannot continue without your support. Please send us anything that might be useful for the cause. Even if it is not polished we can work with it.

If you have genetics problems with which you are having difficulty, feel free to share them with us. If we can't find the answer we will put it out to the readership.

If you have some unusual or unique way of presenting an idea or concept, please share it with us. Ask yourself how many of your teaching ideas were original with you and realize what a debt you owe to your fellow educators.

True to our name we want to explore knowledge and techniques the way a DNA probe can home in on matching DNA among cells. Like the old saying, all of us are smarter than any us.

So please set a deadline for yourself to submit something to the newsletter. Three weeks should be enough time, don't you think?

-The editors

## **Genetic Evangelism: Spreading the Word**

Helen Griech from Willingboro spoke at her local Rotary Club in Burlington, New Jersey on August 5th. The group was very interested in all of the aspects of the Human Genome Project. Her headmaster is trying to get her on the program for the New Jersey Association of Independent Schools meeting in the fall.

Linda Levely of Royal Oak, Michigan will be presenting the BSCS labs at the Metro Detroit Science Teachers Association on November 20. She usually runs through the first two labs and previews Nathaniel Wu as well as the alcohol lab. This lets the teachers become comfortable with these labs and gets the bugs out before they use these with their students.

Penny Wolkow of Columbia, Maryland is planning a workshop for her state science teachers association convention. It will feature Genetic Resource Professional (mentor) Corinne Baehm, from Johns Hopkins DNA Diagnostic Laboratory.

Continued on page 2.



# *The HGP Vector*



Volume 1 No.2: Winter 1994

## **SPREADING THE WORD: News from the Trenches**

**Cissy Bennett** of Alabama talked to the Jefferson County Chapter of the State Society for Medical Technologists (ASSMT) about the Human Genome Project and its impact on genetic counseling. She was then invited to present at the statewide ASSMT meeting in April. She has also done a presentation on biotechnology and its relevance to today's youth for her local school board. In November, Cissy was in Boston presenting a session on teaching bioethics to high school students at the National Association of Biology Teachers Conference.

This winter **Don Tatge** of Jefferson High School in Minnesota, will be teaching a Human Genetics and Bioethics workshop for elementary teachers. The workshop is six hours in length with emphasis on hands on materials suitable for fifth and sixth grade students.

**Chuck Smith** of Oregon has been spreading the word at a series of mini conferences funded with Woodrow Wilson funds in Vancouver, Washington. Early in the fall he gave an overview of the Human Genome Project and briefly discussed the BSCS activity number two. In November he had the participants work through activities number one and two. In January he is planning on having the participants work through Activities number three and four. Also in January Chuck will be attending the Research Corporation Annual Meeting held in Tucson, Arizona where he will

## **IN THIS ISSUE...**

**PAGE 1 ... NEWS FROM FRIENDS  
AT THE FRONT**

**PAGE 3 ... FREE AND  
INEXPENSIVE**

**PAGE 4 ... NSTA CONVENTION  
NEWS**

**PAGE 4 ... GENETICS SOFTWARE  
REVIEW**

conduct a two hour workshop in biotechnology for twenty four teachers. One of the lab Activities he is planning to present involves an easy-to-use "mini-prep" for extracting plasmid DNA from *E. coli*. He believes it is of value for high school students as a way of showing them how to get plasmids out. This could be used either before or after transforming bacteria. Also, it is a way for teachers to maintain a ready supply of purified plasmids in their laboratory freezer.

**Sharon Zupo** and **Chuck Smith** also presented an overview of the Human Genome Project and BSCS Activity number two at the Oregon State Science Teachers Association area meeting in October. Teachers at all the sessions agreed that they intend to use the materials in their classrooms.

**Mark Stalling** did a presentation on the

Continued page 2.



# *The Genetic Probe*



Volume 1 No.3 Spring 1994

## **Newsletter Suffers from Identity Crisis**

In case you didn't notice, our newsletter has two names. It started off as *The Genetic Probe*, but the last issue had a new name - *The HGP Vector*. Okay, okay, so I forgot. Anyone could do it. Right? Oh well, my apologies to one and all. I will from this day forward resist the temptation to monkey with the moniker.

Please don't let this be an excuse for not sending in your stories and information for our publication! When T.S. Eliot told us that "April is the cruellest month" I am quite sure that he was not speaking about teachers facing the end of the year but it applies. Never is the calendar so full. We face prom, end of the year parties, a panoply of field trips releasing students from a long winter, faculty meetings, in services, final exam preparations, and more.

Of course, when you read these words you will be in the final downhill slide to June. It is already too late for you to help the *Messenger* for this issue. But let me exhort you to bring materials to the June conference for the fall issue. If you do not, we will search you out! We will rattle your door late at night when you are finally asleep. We need COPY!

See you in Kansas City.

Jon Bealer

## **IN THIS ISSUE...**

**PAGE 2 ... SPREADING THE  
WORD**

**PAGE 3 ... BSCS FIELD  
TESTS HGP MATERIALS**

**PAGE 4 ... RESOURCES AND  
MATERIALS**

**PAGE 5 ... COMMENTS**

## **Science and Social Studies DO Mix**

I had the opportunity to present the HGP materials to a group of social studies teachers last week. Isn't that remarkable? It looks so plain in black and white but it really made my day.

I asked the social studies department chair at the beginning of this school year if her department might be interested in such a presentation. She agreed but never said anything more. A couple of months ago I was talking informally to a member of that department and the subject came up. This fellow got really excited. Next thing I knew the department chair was back asking when I'd be able to talk.

So after school we had a one hour meeting. I had to ask for an "all-call" announcement to get

Continued on pg. 2.



# *The Genetic Probe*



Volume 2 No.1 Winter 1995

## EDITORS CORNER

We hope that you all had an enjoyable holiday season and we trust that you are rested and ready to start the new year. Thank you so much for responding to the request for material to be included in *The Probe*. I know that you are all very busy, but because you are busy you also have much to share. The response was overwhelming during the month of December.

Our NABT reporter, Linda Davis, said the convention was a success, and that nearly two dozen K. C. participants presented and shared some aspect of their summer experience. I wish I could have been there to hear the presentations and to participate in the line dance instruction given in the hotel ballroom. Linda says pictures were taken and copies will be sent for the asking.

Linda also reports that the NABT booth was filled with new books and made shopping there very convenient. The vendors were happy to see them and many had presented materials for use with high school students involving biotechnology. She said the atmosphere was friendly and lots of networking went on by everyone. K.C. participants did stake out a portion of the lounge on Thursday night to get together, and next year, if all goes well, we'll plan another reunion. I think I will have to make that convention a priority for next year, how about the rest of you?

## CONGRATULATIONS!!!!

Many of you probably saw Cissy Bennett on the cover of the NABT publication *News and Views*. It was a profile of her as the NABT state representative for Alabama and described her unique contributions to the organization. She, like many of you, was able to obtain a commitment from a biological supply house to provide her with free biotechnology kits which she used to train other biology teachers. She was also able to obtain, on loan, some videodiscs to use at her workshop which ultimately led to her receiving a disc free. When groups of teachers get together and share as Cissy is doing or as we did in K.C., we are able to keep our curricula alive for our students.

Tom Haren from Canton, Ohio, received the Outstanding Biology Teacher Award for Ohio this year. He is working hard to enrich his genetics unit by having Melonie Krebs Michelson from the Childrens Medical Center Hospital of Akron come in and give a presentation to his classes. He is also working with Dr. Vance Lemmon from Case Western University, on planning a visit for his students to his research lab in Cleveland this spring.

Daryl Ann Miller was awarded an Endowed Teaching Chair from Broward Community College in Pembroke Pines, Florida. What this involves is \$15,000 cash and \$7,500 to develop a college project. Congratulations!