IN VIVO

The Newsletter of the Metropolitan Association of College and University Biologists

Spring, 1999 Volume 20, Issue 3

CALL FOR EXECUTIVE BOARD NOMINATIONS PAGE 2

BRUCE ALBERTS LAURIE GARRETT

TO PRESENT KEYNOTE ADDRESSES AT 32ND ANNUAL MACUB CONFERENCE

NASSAU COMMUNITY COLLEGE TO HOST MACUB CONFERENCE SATURDAY, NOVEMBER 13, 1999

Nassau Community College will host the 32nd Annual Fall MACUB Conference on Saturday, November 13, 1999 The conference theme for this year is *"Biology Into The New Millennium"* and will feature keynote addresses by Dr. Bruce Alberts, and Laurie Garrett.

Bruce Alberts, President of the National Academy of Sciences in Washington, D.C., is a respected biochemist recognized for his work in both biochemistry and molecular biology. He is noted for his extensive study of the protein complexes that allow chromosomes to be replicated, as required for a living cell to divide.

Bruce Alberts

He has spent his career making significant contributions to the field of life sciences and has long been committed to the improvement of science education.

Laurie Garrett presently is a medical writer for *Newsday.* She is the author of *The Coming Plague: Newly Emerging Diseases in a World Out of Balance*. In addition, Garrett was a Pulitzer Prize 1996 Winner for Explanatory Journalism for *Ebola.* She was awarded the 1997 Peabody Broadcasting Award for *Science Story,* and the 1998 Polk Award for International Reporting for *Collapsed Empire, Shattered Health.*

MACUB MINI-CONFERENCE AT THE THE HALL OF BIODIVERISTY

MACUB members and their guests attended the MACUB Hall of Biodiversity Mini-Conference on Saturday evening, February 6,1999. Suzie Zetkus, who has been our volunteer tour guide for two previous mini-conferences, lead our group through the newly opened (May, 1998) Hall of Biodiversity at the American Museum of Natural History.

Upon first entering the exhibit, we encountered the Spectrum of Life, a 100-foot wall-and-ceiling area replete with organisms representing the great diversity of life that exists today. A 105-year old giant squid floated above us, as well as schools of fish. This squid specimen, and others such as the giant clam, have been rescued from the old Hall of Invertebrates and have been placed in this new exhibit.

At the endangered species subsection of the Spectrum of Life, Ms. Zetkus gave us a personal approach of how she deals with biodiversity and extinction. Suzie noted that she would have a hard time eating shrimp again after realizing that for every pound netted, there are four to five pounds of fish caught as well. Many of the mammals collected in the 1930's by the Museum (such as tigers) would not be today, because they are endangered. "I'd feel guilty if I wore rayon instead of cotton, knowing that wood chips from precious trees are used to make the former", she said. The skin of amphibians is very sensitive to changes in the environment, and thus amphibians may serve as biomarkers for potential environmental problems. Many amphibians are endangered, and many may have gone extinct because of their sensitive skin.

As we walked over the floor-inlaid Sixth Extinction exhibit, Suzie reminded us that even though there have been five major extinctions, we are losing species today at an accelerated rate. The former five

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The Newsletter of the Metropolitan Association of College & University Biologists

Serving the Metropolitan New York Area for 32 Years

CALL FOR NOMINATIONS

The terms of office for the following positions will be up for re-election to serve on the Year 2000 Executive Board:

Vice-President
Treasurer
Recording Secretary
Members-at-Large - 2 positions

The duties of these officers will involve attending all Executive Board meetings in addtion to specific duties as described below:

The Vice-President will establish and serve as chairperson of the Advisory Board Council. In the event the President is no longer able to serve, the Vice-President will automatically succeed to the presidency for the remainder of the term.

The Recording Secretary of the Association shall record Board Members who are present, absent, or excused from Executive Board meetings and shall take and distribute the minutes of the Executive Board meetings, the annual business meeting and any other officially sanctioned meetings as advised by the Executive Board. The Recording Secretary is responsible for Election Committee duties as stated in Article VIII of the By-laws.

The Treasurer of the Association is responsible for the preparation of an annual fiscal report, processing of dues, preparing regular financial reports for the Executive Board meetings, income tax reports, and other duties usually pertaining to this office.

The Members-at Large shall chair committees (Articulation, Exhibition, etc.) and handle other assignments as directed by the Executive Board.

Normally, each candidate for Vice-President, Recording Secretary and Treasurer should have been a Member-at-Large for at least one term and each candidate for Member-at-Large should have attended at least one Annual Conference.

DEADLINE FOR NOMINATIONS is **June 15, 1999.**
If you are interested in running for office (or wish to nominate anyone else), please send a letter of nomination to:
Prof. Phyllis Krasnow
Department of Science
Rockland Community College
145 College Road
Suffern, New York 10901

CALL FOR PAPERS

IN VIVO is published during the Fall, Winter, and Spring. Members are asked to submit papers, abstracts and articles to be included in future editions of **IN VIVO** to: Dr. Pamela Monaco, Molloy College, Department of Biology, 1000 Hempstead Avenue, Rockville Centre, NY

CANCER: ITS DISPROPORTIONATE EFFECTS ON THE HEALTH OF MINORITIES AND THE MEDICALLY UNDERSERVED

Mozaffar Hassan and Edward J. Catapane Department of Biology, Medgar Evers College, CUNY, 1150 Carroll Street, Brooklyn, NY 11225

Cancer, the uncontrolled growth and abnormal proliferation of cells that spreads unpredictably throughout the body resulting in metastasis, is believed to result from viral infections, carcinogenic chemical contamination, exposure to radiation and hereditary factors. In recent years two classes of genes, the oncogenes and the tumor suppressor genes have been attributed to the genesis of cancer. Retroviruses are well documented for causing malignant tumors in animals, and hereditary factors associated with susceptibility to developing cancer are beginning to be understood. Proto-oncogenes, which are necessary for normal cellular functioning, can be mutated to oncogenes in normal cells and cause the cell to exhibit a high mitotic activity resulting in uncontrolled division and invasive growth (1). The inactivation of a tumor-suppressor gene due to the intervention of carcinogens such as chemicals or radiation will initiate a process of carcinogenesis called promotion. Once a cell has been promoted to the cancerous stage, continued cell division results in the formation of a malignant tumor which later becomes metastatic. Cancer now is believed to be a disease of "altered genes" and "altered genetic functions." The changes are passed on or acquired as a result of physical factors such as radiation, chemical factors such as carcinogens. The chronic infection by viruses, such as papilloma virus are attributed to cervical cancer, and Hepatitis B and C viruses (HBV & HBC) are predicted to be associated with liver cancer (2). In humans, T-cell leukemia, Burkitt's Lymphoma, nasopharyngeal carcinoma, hepatocellular carcinoma, skin and cervical cancers are believed to have viral etiology.

Cancer impacts all populations throughout the world. Cancer is the second leading cause of death in America, and it continues to kill thousands of Americans each year. The most frequently diagnosed cancers are leukemia, Hodgkin's Lymphoma, and the cancers of the lung, prostate, colon, rectum and stomach. The risk of developing cancer is known to be strongly associated with tobacco use, fatty foods, poor nutrition, substandard environmental conditions and polluted habitats.

Cancer mortality is declining. Currently incremental improvements in cancer treatment and management are being seen. New drugs and improved radiation applications to the cancerous tumors hold promise. Despite this, the poor populations of the world and minorities in the United States are experiencing significantly higher cancer mortalities than the general population. The U.S. Department of Health and Human Services as well as the National Cancer Institute indicates that the incidence of cancer deaths in minorities, including African Americans, Hispanics, Asian Americans, American Indians and Native Alaskans shows large variations (3,4). The most frequently diagnosed cancers of all groups are cancers of the breast, colon, lung, prostate and stomach. These types of cancers affect our nation's minority populations more than others. Black men have higher incidence of prostate cancer than any other population of the world. Breast and colorectal cancers in Black females are disproportionately high. South Asian American men have a greater incidence of liver cancer. Alaskan men experience a much higher rate of colorectal cancer than any other ethnic groups in the United States. Table 1 shows the types of cancers that affect minorities more than the general population. Table 2 shows the five most frequently diagnosed carcinomas for men and women among various population groups. The incidence of lung cancer in African American men is 117 per 100,000 people as compared with 79 per 100,000 of the general population. The occurrence of prostate cancer in Black men is 181 per 100,000 as compared with 68 for the general population. The mortality rate of prostate cancer in Black males is 55.5 per 100,000 as compared to 26.5 for the general population (5).

The past ten years have brought forth greater improvements in the screening, diagnosis, treatment and management of cancer, but this upturn is not spread evenly among all Americans. The "War on Cancer" was declared by President Nixon in 1971 and the past 27 years have seen advances in the prevention, detection, treatment and quality of life among the survivors; however, the trends are not being afforded to all Americans. Cancer continues to be a major health problem for minorities and the poor. The latest reports indicate that cancer incidence rates are 11% higher in African-Americans and the mortality rates almost 35% higher (6). Numerous studies have been published to identify the causes of these higher rates. The disparity is attributed to a variety of causes, including: poverty; genetic predisposition; smoking; environmental carcinogens; diet; failure of early detection and delayed diagnosis; diagnosis and the treatment as well as the outcome of the disease; and lack of education and facilities about cancer within the minority communities.

Over the past decade the National Cancer Institute and the American Cancer Society started the Biennial Symposium Series to spotlight the

disproportionate incidence of cancer in minorities and the medically underserved populations of the United States. The first Biennial Symposium Series was held at Houston, Texas in 1987. The primary objectives were:

1. to apply screening, prevention and treatment of cancer to minority and medically underserved groups,
2. to provide a forum for scientific exchange among researchers, clinicians, minority communities and other lay groups where the incidence of cancer is high,
3. to increase patient education and provide an overview of how best to convey essential information concerning cancer, and
4. to organize and provide a forum for annual meetings of issues of cancer among minorities.

As a result of the 1995 Biennial Symposium Series an Intercultural Cancer Council (ICC) was created. The initial members of the ICC included the Anderson Cancer Center of Baylor College of Medicine, Howard University Hospital, the Susna G. Komen Breast Cancer Society, and the Kellogg's Company. The membership now has grown to forty organizations. The mission of the ICC is to reduce the higher incidence and deaths from cancer among minority, the poor and underserved populations of the United States. The agenda of the ICC is that:

1. All poor Americans including minorities must have access to cancer screening, detection, diagnosis, treatment, post-treatment and long term services.
2. All Americans, particularly minorities, should be educated about cancer prevention. Such prevention benefits must be provided in a variety of health care settings.
3. Appropriate materials must be disseminated to the community.
4. Minorities must play a major role in developing health policies.
5. Research and control programs on cancer that affect minorities, such as relevant risk factors, must be included in the studies.
6. Effective interventions be identified.
7. Diverse populations must be represented fully in clinical studies supported by the public and private sectors.
8. Researchers, technical and support staff must be in the study programs.
9. Health care providers must be hired and trained from a variety of racial, ethnic and culturally diverse groups. These individuals must be involved in the design and delivery of cancer prevention and education.

The ICC has been successful in getting funding and planning help from the National Institute of Health (NIH), the National Cancer Institute (NCI) and the Centers for Disease Control (CDC). The NIH and NCI have increased funding to ICC by 44%. The CDC has engaged in concerted efforts to find solutions to cancer problems of minority populations. The CDC has initiated a comprehensive breast and cervical cancer screening program in all fifty states. The efforts to control cancer in minority populations must be concerned with changing the health care environment of minority populations. An aggressive educational program must be set up at local and national levels to inform people of the facilities for prevention, screening, testing early diagnosis and treatment, and the twelve Quality Cancer Care Declaration of Principles (Table 3) must be actualized.

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Table 3: Quality Cancer Care Declaration of Principles

1. People with cancer have the right to a system of universal health care. This access should not be precluded because of preexisting conditions, genetic or other risk factors, or employment status.
2. Quality cancer care should be available in a health care system with standards and guidelines that are developed in consideration of treating the whole person with cancer. Health care plans must regard the cancer

TABLE 1

Type of Cancer	Minority Population Disproportionately Afflicted
Breast	African Americans, Native Hawaiians
Cervical	African Americans, Hispanics, American Indians, Koreans, Vietnamese
Colorectal	Elder Citizens, American Indians, Alaskan Indians, African Americans
Liver	Asian Americans, Alaskan Natives
Lung	African American, Asian American, American Indians, Alaskan Natives
Prostate	African Americans

Data obtained from the Task Force for Cancer Prevention, Screening and Early Detection, Intercultural Cancer Council (ICC), 1998.

Table 2: Cancer and Minorities (the five most frequently diagnosed carcinomas, 1988-1992)

Annual Cases per 100,000 Men

	Lung	Colorectum	Prostate	Stomach	Kidney	Liver	Oral	Bladder
Alaska Native	81	80	46	27	19			
American Indian		14	19	53	16	13		
Black	117	61	181	20			20	
Chinese	52	45	46	16		21		
Filipino	53	35	70			11		
Hawaiian	89	42	57	21				
Japanese	43	64	88	31				14
Korean	53	32	24	49		25		
Vietnamese	71	31	40	26		42		
White (non-Hispanic)	79	58	138					33
Hispanic (total)	42	38	89	15				16
White Hispanic	44	40	93	16				17

Annual Cases per 100,000 Women

	Breast	Colorectum	Lung	Kidney	Cervix	Ovary	Uterus	Stomach
Alaska Native	79	67	51	17	16			
American Indian	32	15				18	11	
Black	951	467	44		13		14	
Chinese	55	34	25			96	12	
Filipino	73	21	18				12	
Hawaiian	106	31	43				24	13
Japanese	82	40	15				15	15
Korean	29	22	16			15		19
Vietnamese	38	27	31		43			26
White (non-Hispanic)	116	39	44			16	23	
Hispanic (total)	70	25	20		16		14	
White Hispanic	74	26	20		17		15	

Source - National Cancer Institute

Table 3: Quality Cancer Care Declaration of Principles

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1. People with cancer have the right to a system of universal health care. This access should not be precluded because of preexisting conditions, genetic or other risk factors, or employment status.
2. Quality cancer care should be available in a health care system with standards and guidelines that are developed in consideration of treating the whole person with cancer. Health care plans must regard the cancer patient as an autonomous individual who has the right to be involved in decisions about his or her care.
3. Standards of cancer care should be driven by the quality of care, not only by the cost of care, and should include participation in clinical trials and quality of life considerations.
4. All people diagnosed with cancer should have access to and coverage for services provided by a multidisciplinary team of care providers across the full continuum of care. Health care plans should be held accountable for timely referral to appropriate specialists when symptoms of cancer or its recurrence may be present.
5. People with cancer should be provided a range of benefits by all health care plans that include primary and secondary prevention, early detection, initial treatment, supportive therapies to manage pain, nausea, fatigue and infections, long term follow-up, psychosocial services, palliative care, hospice care, and bereavement counseling.
6. People with histories of cancer have the right to continued medical follow-up with basic standards of care that include the specific needs of long term survivors.
7. Long term survivors should have access to specialized follow-up clinics that focus on health promotion, disease prevention, rehabilitation, and identification of physiologic problems. Communication with the primary care physician must be maintained.
8. Systematic long term follow-up should generate data that contributes to improvements in cancer therapies and decreases in morbidity.
9. The responsibility for appropriate long term medical care must be shared by cancer survivors, their families, the oncology team, and primary care providers.
10. The provision of psychosocial services must be safeguarded and promoted. Persons diagnosed with cancer should receive psychosocial assessments at critical junctions along the continuum of cancer care to determine availability of needed support and their ability to seek information and to advocate on their own behalf.
11. Psychosocial research is integral to comprehensive cancer care, and, as such, psychosocial outcome measures should be included in all future clinical trials. The importance of this research and its application and transfer to oncology care plans should be recognized and encouraged.
12. Cancer survivors, health care providers, and other key constituency groups must work together to increase public awareness; educate consumers, professional, and key public policy makers; develop guidelines and disseminate information; advocate for increased research funding, and articulate for and promote survivors' rights.

THE 31ST ANNUAL MACUB CONFERENCE

Maritess J. Leyva and David Spinnato, MACUB Associate Members, St. John's University, Jamaica, NY 11439

WORKSHOP DESCRIPTIONS

Three concurrent workshops were presented by Lynn Margulis, Alison Pitt, and Andrew Wier, Department of Geosciences at the University of Massachusetts, and Ronnee Yashon, a nationally known expert in teaching bioethics in the science classroom at the Annual Conference.

Andrew Wier presented a workshop on "What Happens to Trash and Garbage? An Introduction to the Carbon Cycle". The carbon cycle was explored by examining what happens to trash and garbage. This workshop involved a video, photosort activity, carbon dioxide production, and a look at how life has rearranged the distribution of carbon on the planet.

Alison Pitt presented a workshop on "Living Sands: Mapping Time and Space". Participants were involved in examining the Foraminifera, exploring the concepts of biostratigraphy and the law of superposition. This activity group included a short video, sand sort activity and close examination of several different types of fossil and extant Forams.

Dr. Lynn Margulis presented a workshop on "Peas and Particles: Understanding to Visualize Population Growth". Participants in this group were asked to visualize large numbers, while exploring exponential growth. The objective of this workshop was to improve estimation skills, and promote better understanding of large numbers. The activities included: counting and estimating large numbers, developing new methods of rapid estimation, analyzing photographs of populations and their growth, a short video on reproduction and population growth and a demonstration of the vast difference between sex and reproduction.

Ronnee Yashon, presented a workshop on "Bioethics in the Classroom: The Case Study Method". Important bioethical cases, such as: new reproductive techniques, genetics and gene therapy, cloning, the Human Genome Project, and the environment were used.

EXHIBITOR DISPLAYS AND POSTER PRESENTATIONS

Exhibitor displays and student poster presentations were also highlighted at the MACUB Conference. The 1998 Joseph Concannon Memorial Research Award Grant was awarded to research *The Non-Native Vascular Flora at Ellis Island, NY.* Researchers included: Maritess Leyva, David Spinnato, Stephen Scotto, Luis Samanamud, Ching Leung Cheung, and Richard Stalter, from the Department of Biological Science, St. John's University, Jamaica, NY. The presenters of this poster were Maritess Leyva, David Spinnato, and Richard Stalter, Ph.D.

Instructional Technology for the Biology Curriculum

Laura Pannaman, Ph.D., Assistant Professor of Biology and John C. Grew, Ph.D., Assistant Professor of Biology, New Jersey City University, Jersey City NJ 07305-1597.

The authors embrace varied aspects of computer technology as teaching resources. We have seen the range of educational technologies developed over the past two decades, from videotaped demonstrations as replacements for laboratories (worst) to multimedia and internet resources (best). We employ varied instructional materials in our courses, including, but not limited to: printed materials, 'wet' labs, field trips, multimedia presentations, computer simulations, and internet resources. However, we insist on active student participation in learning activities. We accept neither the prospect that students will acquire skills and knowledge passively, nor that computer technology can entirely replace classroom instruction or laboratory exercises.

Nevertheless, computers have several attributes useful to educators and students, including the abilities to: 1) rapidly manipulate complex data sets; 2) provide high-speed, high-quality image and video data; and 3) allow for user interaction with programs that actively engage students in multiple utility learning. Computers, therefore, can illustrate dynamic processes which cannot be directly visualized (e. g., photosynthetic electron flow); perform mathematical modeling of ongoing processes spanning vast time periods (e.g., divergence of finch populations in an island ecosystem); and rapidly and repeatedly generate results from varied and specific virtual experiments that would be impracticable or objectionable to perform in vivo (e.g., population genetics of successive generations of mutant fruit fly strains). Recently, network computing and internet applications have advanced these capabilities tremendously, enabling users to tap far greater processing, storage and program resources than are available in desktop machines.

We offer the following reflections on instructional technology which we have either reviewed or implemented, for better or worse. All resources listed below have positive attributes, but it should be borne in mind that internet offerings tend to run more slowly, particularly when viewing graphical content, while CD-ROM products are often costly. Furthermore, applications such as illustrating lectures with CD-ROM-based textbook art require expensive projection or computers.

GRAPHICAL AND VIDEO DATABASES

Among the earliest instructional products were videodisk collections of illustrations and images from textbooks which provided random access to textbook art. Image databases are now supplied on CD-ROMs, a format offering distinct advantages over bulky and typically incomplete transparency or slide sets. *The Art of MBoC3 (Molecular Biology of the Cell, 3rd edition)*, *Art of Immunobiology* CD-ROM and *The Instructor's Presentation CD-ROM for BIOLOGY,* 5th Edition are products employed by the authors which provide complete sets of textbook figures in small, portable packages.

A.D.A.M. (*Animated Dissection of Anatomy for Medicine*), an early, ambitious and successful CD ROM product, made a broad impact on gross human anatomy instruction in K-12, undergraduate and medical educational environments. A.D.A.M., however, was expensive and suffered from a too complex interface which led to its redesign (A.D.A.M. *Interactive Anatomy*), and which spawned competitive products that were easier to use. The *Dynamic Human* is an inexpensive product which addressed ease-of-use, but at the expense of adopting a simplistic, systemic anatomy approach. *The Visible Human Project* of the National Library of Medicine provides cross-sectional images of male and female cadavers, free of charge via the World Wide Web, and is supported by several dedicated laboratory manuals and atlases (Visit http://www.jbpub.com/visiblehuman/index.htm for information).

Microscopic anatomy (histology) instructors have long embraced computer-accessed image databases (*Human Light Microscopy II, Wheater's Interactive Histology)*. Furthermore, many medical schools publish extensive online histology (often with pathology) image databases (*The JayDoc HistoWeb, LUMEN Histology, Human Histology Images)*. These provide free, round-the clock access for students to review, compare and even download micrographs.

Many students struggle with the basic chemistry and biochemistry content of introductory courses because they cannot visualize the structures and processes involved. There are, however, both CD ROM and internet offerings which render atomic and molecular structures and animate the transformations that occur during chemical reactions. *The Chemistry of Life* CD-ROM illustrates and animates atomic and molecular structures and metabolic

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processes in an extremely user friendly format. More sophisticated instructors and students might utilize *RasMol*, a program that enables users to visualize, in different renditions, color schemes, orientations and aspects, biological molecules based on molecular coordinate data obtained via the internet. The main advantage of *RasMol* is that the application itself runs locally, and the internet is only used to download small molecular description files.

MATHEMATICAL MODELING AND SIMULATIONS

Several programs and internet resources enable students to study long-term, complex or impracticable biological processes interactively. The scope, duration or nature of certain experiments are such that they cannot be performed, or would be objectionable to perform, in a college course. The principal strength of the following programs is the indefinite repetition and seemingly infinite manipulation of independent variables and the generation of quantitative data. Thus, students experience the experimental process itself through these simulations, executing experiments of their own design and interpreting the results.

The Virtual Physiology Lab, a CD-ROM based simulation program, overcomes objections to the use of animals in classical experiments in nervous, muscular and cardiovascular physiology. Similarly, A.D.A.M. *Interactive Physiology* simulates many of these experiments in the human, and extends the scope of experimentation to the respiratory, digestive and urinary systems. Students employ BIOPAC *Student Lab Pro,* along with various transducers, to gather live-time physiological data from colleagues and to perform sophisticated analyses and transformations on the data sets.

In *The Virtual Fly Lab*, an interactive internet resource based on a sophisticated algorithm, students study of patterns of inheritance of dominant, recessive, sex-linked, lethal, epistatic and linked traits through successive generations. Students select from over thirty different Drosophila mutations, individually or in combinations, and selectively breed flies and evaluate the results of the matings. Students use *The Virtual Fly Lab*'s statistical module for the analysis of large numbers of offspring of different types, saving time, resources and money.

Eco-Beaker is an ecology simulation program, with which students manipulate various environmental and organismal parameters and observe their effects on an ecosystem. Through these exercises, students develop better understanding of major ecological concepts that would otherwise be impossible or impracticable to demonstrate in the field because of institutional location, weather, and the large scale and long duration of ecological studies.

EvolveIT is an internet-based simulation of natural selection, macroevolution and the origin of species, processes and outcomes that cannot be physically demonstrated. With *EvolveIT*, students follow the evolutionary history of a hypothetical population under selective environmental conditions of the students' choosing. *EvolveIT* affords students the opportunity to direct a hypothetical evolutionary process in a brief time span, an experience that is lacking in conventional examinations of static fossils, models and dioramas.

LIBRARY ACCESS AND INFORMATION RETRIEVAL

The computer has revolutionized the scientific literature search. Initially, CD-ROM-based programs like *MedLine* and *Current Contents* allowed investigators to search the literature by subject, author, key word, etc. These facilities have become the standard methods of literature search. Several search engines (e.g., Internet Grateful Med, PubMed) are now available to the public via the internet, courtesy of The National Library of Medicine, The Library of Congress, The National Science Foundation and various private and public institutional libraries. Hyperlinking of search results often enables one-click access of publications of interest, greatly reducing library time and increasing the variety of offerings available in university libraries.

Many mainstream (e.g., *The New York Times on the Web*) and scientific (e.g., *Science Online*) publications are available via on-line subscriptions. Furthermore, many publishers are making their journal offerings available to subscribers online. HighWire Press and John Wiley & Sons are two scientific publishers that offer a wealth of information and online resources via the internet. In fact, most on-line journals allow access to tables of contents and abstracts free of charge, permitting library research to begin on the desktop. The *MIT Biology Hypertextbook* is an on-line hyperlinked and searchable textual resource providing students with a round-the-clock review text and practice problems covering introductory molecular biology course material. Developed as a computerized supplement for an alternative freshman curriculum, it could serve as an ancillary to a traditional text in an introductory biology or cell

and molecular biology course.

MULTIMEDIA PRESENTATION AND INTERNET AUTHORING

Many academic departments require seminar courses, wherein students orally present library or laboratory research. The traditional transparency medium greatly restricts the nontextual content and polish of these lectures. The authors recently implemented a requirement that students prepare seminar and course presentations with Microsoft PowerPoint, with dramatic results. Student presentations are far more engaging, colorful and coherent, and more closely resemble the presentations given at professional scientific meetings. Students have minimal difficulty using PowerPoint because of its ease-of-use and previous experience with microcomputers and other applications. Students occasionally become so engaged by the creative process that they embellish their presentations until computer processing power and memory become limiting.

Many faculty, including the authors, have created internet 'homepages' to support their courses (e.g., Principles of Biology II Homepage). Although time-consuming to produce, these homepages provide students with pertinent course information and content, and allow immediate access to hyperlinked resources such as those listed herein. As institutional support for such endeavors improves, the creation and maintenance of faculty homepages will become routine.

ELECTRONIC REVIEW AND STUDY AIDS

The CD-ROMs included or bundled with textbooks include chapter reviews, images and videos, glossaries, hyperlinks and practice exams. These products vary in quality and usefulness, but the best are engaging and easily navigated, have high quality graphics and animations, contain interactive exercises with feedback, and provide opportunity for self-assessment. *Explorations in Human Anatomy and Physiology* and *Understand! Biology: Molecules, Cells & Genes* are suitable standards for comparison when evaluating other products.

Many publishers have published web sites to service students using specific texts. Well designed sites contain the same elements as well designed CD-ROM-based products. The Biology Place is a site familiar to both authors, as it is associated with our freshman majors' text. In addition to the attributes mentioned above, this site provides for feedback to textbook and homepage authors from students and instructors via e-mail.

FUTURE DIRECTIONS

As publishers continue to offer textbook ancillaries, learning aids and other products via the internet and on CD-ROM, there educators must consider the economic impact of our utilizing these resources. As student use of internet sites increases, so will the collective demands for institutional bandwidth. The authors contend that applications such as graphics databases and simulations are run best locally from CD-ROMs, which can be expensive. Institutions must address the issue of financing adequate internet bandwidth, while faculty must carefully consider the economic burden placed upon our students by the costs of CD-ROM-based applications and ancillaries bundled with already expensive textbooks.

The authors utilize many multimedia and internet teaching resources, with largely positive results. Much of this success is attributable to student comfort with computer technology. Many products not reviewed here are of lesser quality, difficult to use, or flawed (buggy). Most recent products and internet sites, however, are appealing, highly functional, and suitable for use in college courses. We look forward to new multimedia products and internet resources for delivering course content to students in unique and exciting ways.

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(*Hall of Biodiversity - Continued from page 1)*

extinctions were due to climatic or other natural phenomena, whereas the sixth is the one that humans are causing. Organisms representative of the five major extinctions were displayed in below-the-floor cases.

Opposite the Spectrum of Life wall, there are eight major biomes depicted in video pictures on long panels. These pictures change every few minutes to reveal the stunning array of colors and forms found in tundra, grasslands and savannahs, temperate and boreal forests, tropical forests, coral reefs and coastal wetlands, deserts, freshwater wetlands, lakes and rivers, and oceans. Voices and words add depth to this exhibit. One exhibit demonstrated the fact that fresh water makes up only 0.1% of the total water on earth. That's like being able to use only a dropper of water from a full bathtub!

The center of the exhibit is dominated by the largest diorama in the world, the Dzanga Sangha Rain Forest, modeled after the same in the Central African Republic. Suzie remarked that she had helped painstakingly craft some of the leaves in the exhibit, of which there were close to a half million! Among the dense vegetation, one could glimpse elephants and their dung—four pounds an hour—which many insects utilize. The rain forests are extremely biodiverse. For example, there are 100 different bat species in a 100 square kilometer area. The longer we looked at this dimly-lit and mysterious rain forest, the more creatures we could see. It was truly a spectacular creation. According to the Museum's web site, the exhibit designers originally wanted to build nine dioramas, but decided to make this one biome the centerpiece of the exhibit—the biome with the richest, yet paradoxically, the most endangered biodiversity.

One of the most sobering parts of the exhibit was a map that showed the exponential growth of the world human population. A red light would appear along with a date when a million people were added to the planet. Lone pin-pricks of red were soon crowded out by continuous fields of light as the population rapidly increased. The doubling of the population since 1950 was truly dramatic. The population shot up dramatically in the currently developed countries after the Industrial Revolution. This display would be a great model to depict population growth to students.

The Hall of Biodiversity is an excellent place to take your students to demonstrate the great diversity of living organisms and the environment's effect on them.

After the tour, a few sat down with the interactive computer terminals or watched some of the informative videos. Some of some of us dined at the Ocean Life Cafe just under the Blue Whale. ❖

Reported by: Kathleen A. Nolan, Ph.D.,
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SYNTHESIS AND CHARACTERIZATION OF ORGANOTIN (IV) COMPLEXES OF THE TRANS-1,2-BIS(4-PYRIDYL)ETHYLENE LIGAND.
Karen Clarke Department of Biology of Medgar Evers College of CUNY, and Stanley A Bajue, Department of Physical Sciences of Medgar Evers College of CUNY, and Choy Lewis, Hunter College, and Fitgerald B. Bramwell, Carolyn P. Brock and Brian Patrick, University of Kentucky at Arlington.

Crystallographic data have been obtained for some tri-organotin (IV) complexes Ph_3SnCl-1/2L and (p-$tolyl$)$_3$SnX-1/2L, [X=Cl, Br, I); L=1,2-bis(4-pyridyl) ethylene (BPE)]. The complex molecules are monoclinic, space group P21/c for Ph_3SnC1-1/2L and P21/n for the (p-$tolyl$)$_3$SnX complexes. The structures consist of molecular binuclear species bridged by the pyridine ligand. The unique tin atom is in a distorted trigonal bipyramidal environment with equatorial *p-tolyl* groups and axial halogen and N atoms. The Sn-N bond distances vary from 2.473-2.490 A with Sn-Cl distances of 2.479 and 2.512 A for Ph_3SnCl-1/2L and (p-$tolyl$)$_3$SnCl-1/2L respectively. The Sn-Br and Sn-I bond distances are 2.660 and 2.907 A respectively for (p-$tolyl$)$_3$SnBr-1/2L and (p-$tolyl$)$_3$ SnI-1/2L. The Sn-I bond distance in (p-$tolyl$)$_3$SnI-1/2L is one of the longest yet to be reported. Further details of the structures, as well as the spectral data will be presented.

Karen Clarke is a participant in the Biology-CSTEP of Medgar Evers College which is funded by grant 0516981085 from the NYS Dept. of Education. This work also was supported in part by grant HRD-9252789 from the AMP program of NSF and grant GM 07823-19 of the MARC program of NIH.

PRELIMINARY RESULTS ON THE ISOLATION AND IDENTIFICATION OF NOVEL MARINE BACTERIA WHICH ARE EPIPHYTIC ON SEAWEEDS OF THE NEW JERSEY COAST
Margaret Brown

The marine environment represents an unexplored area of the development of novel antimicrobial substances. In recent years there has been an increase in pathogenic bacteria which are resist to currently available antibiotics. Development of drugs to combat viral infections is a major focus for the pharmaceutical industry.

Marine seaweeds contain epiphytic bacteria that have been impossible to culture until very recently. New media development has allowed for the growth of these organisms. In this study we have begun to culture, isolate and identify the bacteria which are epiphytic on three marine seaweeds collected from Sandy Hook, N.J.

Enteromorpha intestinalis, *Fucus vesiculosis* and *Fucus spiralis* were collected and washed with sterile seawater. They were placed in 50 ml of sterile seawater and brought to the lab. The seaweeds were swabbed with a sterile cotton swab which was then used to streak minimal marine agar. This agar, in contrast to commercial marine agar, uses only seawater and agar as sources of nutrients. The plates were kept for 30 days at ambient temperature. Growth was extremely slow and the colonies tended to be small. Individual colonies were isolated and streaked to new plates. Gram stains of the colonies prepared.

It is hoped that additional isolation will occur and that identification of these organisms takes place. They are probably unique bacteria which may not appear in currently used identification systems. Cultures of the bacteria will be used to challenge clinical bacteria to determine if bioactive substances are produced.

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GROWTH OF FISHES IN GRENADA
Dorfman,D. Monmouth University, West Long Branch, NJ 07764

Two freshwater fish species were collected from streams, lakes, and ditches in Grenada, West Indies. Collection methods included seining, fishing, and various cage traps. Approximately 300 fish of each species were collected. Species studied were *Tilapia mossambica* (Tilapia) and *Agonostromus monticola* (mountain mullet). An additional 50 Tilapia were obtained from the Taiwanese Agriculture-Aquaculture station located near Grenville, Grenada. All fishes were weighed (grams) and measured (total length in mm). Age of the fishes was determined by removing scales from the side of the body above the lateral line and below the anteriad portion of the dorsal fin, then counting the number of annuli. Wild Tilapia grow slowly, and may attain 120 grams in year class III (in their fourth year of life). The farm reared Tilapia examined for this study were in excess of 100 grams in their first year of life (zero year class), and in excess of 330 grams in their second year of life (year class I). The Taiwanese aquaclturists indicated that they can market Tilapia in their first year of life (year class zero) that weigh 454 grams. Mullet are confined to streams with faster flowing waters. They can reach weights of 300 grams in their sixth year of life (year class III) Grenada, an island nation in the southern Caribbean, has seen a decline in marine fish stocks, due primarily to overfishing, and to minimal capability to enforce fishing laws (only one patrol boat is available for surveillance, and high fuel costs for boat operation minimize patrolling activity). To replace reduced marine fish resources, Tilapia, primarily, and to a lesser extent, mullet, may have to be utilized for replacement. A few cottage industry type farms are raising Tilapia with the assistance of the Taiwanese aquaculture mission. Grenadians however, prefer, the taste of marine fishes. As their human population rises (at the rate of 0.72 percent per year) the demand for fishes

will increase. This increase in the face of declining marine fish tocks. Therefore, an increased effort will have to be made to satisfy the fish needs of the country. The source of this need must come from farm raised fishes. Table 1 illustrates the difference in growth between farm raised and wild Tilapia.

Table 1. Regression Analysis For Tilapia And Mullet

Species	Age X Length (mm)	Age X Weight (g)
Tilapia (aquaculture)	Y=125 + 160(X)	Y=76.6 + 191.4(X)
Tilapia (wild)	Y=78.7 + 36.3(X)	Y=7.4 + 32.7(X)
Mullet (wild)	Y=86.9 + 54.7(X)	Y=10 + 50(X)

EFFECT OF SELENIUM AND SELENATE ON THE GROWTH OF *CHLAMYDOMONAS REINHARDTII*

Willel Fanfan and Rony Dorelian

Chlamydomonas is a eukaryotic, unicellular green algae which is often proposed as an indicator of heavy metal contamination in lakes and streams. Selenium exists in the following oxidation states: elemental selenium, selenite, selenate and selenide. It is both a micronutrient and a heavy metal contaminant. In this study, selenium dioxide and selenate were used to study their effect on the growth of Chlamydomonas. Concentrations of 0, 1, 2.5, 5.0, 7.5, 10 and 20 mg/L sodium selenate and 0, 10, 30, 50, 75 and 10 mg/L of selenium dioxide were prepared from 1% stock solutions and used to determine the effect on the cultures of algae. Turbidity readings and direct morphology measured growth. Chlorophyll was extracted and the concentration was determined. The effect on pH was measured at the start and end of the experiment. Scanning electron micrographs were made of the control and 10 mg/L for selenate and 75 mg/L for selenium dioxide.

The results indicate that selenate is far more toxic than selenium dioxide. Growth with selenate indicates that results at 1.0 and 2.5 mg/L were comparative to the control. Concentrations of 5.0, 7.5 and 10 mg/L showed lower growth. Growth was completely inhibited at 20 mg/L. Morphology indicated that cells were light green at 5.0 mg/L and higher but colorless at 20 mg/L. Results of the measurement of pH at the end of the experiment indicated that all cultures where growth occurred achieved pH values of approximately 9.

Results with selenium dioxide showed much less toxicity. Growth at 10-50 mg/L is comparable to the control. At these concentrations the cells were dark green. Concentrations of 75 mg/L and higher were lethal. The results of pH were similar to results with selenate.

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STUDY THE EFFECT OF SODIUM SELENITE ON THE GROWTH AND MORPHOLOGY OF CYANOBACTERIA *ANACYSTIS NIDULANS*.

Cynthia de la Fuente and Ryan Caballes

Anacystis nidulans is a unicellular photosynthetic cyanobacteria. It has been proposed as a good indicator for environmental contamination in fresh water habitats, especially for heavy metals. Previously, the effect on the growth of *A. nidul*ans with various heavy metals has been studied. Sodium selenite is one of the heavy metals that has not previously been used to study its effect on *A. nidulans.* In this study, various concentrations of sodium selenite (0, 25, 75, 100 PPM) were added separately in the *A. nidulans* culture in the presence of EDTA. The growth was monitored by direct count and turbidity studies. The morphology and pH of the cultures were checked periodically. Morphologically, the cells were elongated in the presence of sodium selenite. Looking at pH, when there was growth in the culture, the pH ranged from 9 to 10. When there was no growth, the pH was approximately 7.9. The results suggested that this organism is quite tolerant to the presence of sodium selenite. In the presence of 25 PPM of selenite, growth was similar to the control. However, the growth was severely or completely inhibited at 50 PPM and higher.

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S. NITROSO GLUTATHIONE (GSNO) MUTAGENICITY

Roger L. Grannum and Elena C. McCoy, Ph. D, Department of Biology, College of Staten Island, City University of New York, Staten Island, NY,10314

The basis of the study was to assess the mutagenic response of S-Nitroso glutathione in *Salmonella typhimurium*. S-Nitroso glutathione is an endogenous carrier of Nitric oxide (NO). Nitric oxide is an important environmental pollutant as well as a multi-faceted bioregulatory chemical in a variety of physiological process including, neurotransmission, vasodilation and immunological host defense.

The initial strains of *S. typhimurium* that were used were Ames tester strains. All of these strains contain mutations in different genes of the histidine pathway. The two strains of interest to us were TA1535 and TA1975. The TA1535 strain contains a *his* G46 mutation. It is a base substitution mutation which when determined by DNA sequencing shows that the amino acid proline is substituted for leucine. Several additional strains employed include the TA 7000 series of Gee and Ames (Salmonella Series II). These strains differed

with respect to the histidine genes involved and the base sequences that are involved and facilitate the determination of mutational spectra.

The chemical that was used throughout the experiment was S-Nitroso glutathione. It has been shown to be mutagenic in TA 1535 which with respect to the *UVR* DNA repair pathway is *uvr*B -. (NO) donors like Glycerol trinitrate have been shown to be mutagenic only in repair deficient strains such as TA1535. We have demonstrated that S-Nitroso glutathione is mutagenic in both repair deficient and repair proficient strains. It is apparent that not all (NO) donors act in the same fashion. The observed mutagenisis may reflect differences in the release of (NO) as well as the mechanism of action with respect to the donor chemical.

To summarize, the objectives of this study were: 1) to compare the mutagenic response of NO-releasing chemicals in a new set of base-specific *S. typhimurium* tester strains recently developed by Gee, Maron and Ames; 2) to examine the effects of nitroso glutathione in these strains since reports have suggested that glutathione may be an endogenous carrier of metabolically released (NO); 3) to determine the effects of the radical scavenger Trolox on nitroso gultathione mutagenicity.

GREEN FLUORESCENT PROTEIN: AN IDEAL REPORTER FOR THE STUDY OF GENE EXPRESSION

Inna Gutman, Diego Guzman and Fausto Ramos

Green Fluoroscent Protein (GFP) is a small, soluble polypeptide found in the jellyfish, *Aequorea victoria*. This protein has a remarkable green fluorescence (max 508nm) when excited with long-wavelength UV or blue light (max 395 & 470nm). Several laboratories have cloned the gene encoding GFP and demonstrated that this protein contains 238 amino acids with a mass of 27 kDa. Cloned GFP has been expressed in viral, prokaryotic, and eukaryotic backgrounds. Numerous variant of GFP which demonstrate their enhanced green fluorescence (5-10X), or are shifted towards the blue or yellow part of the visible spectrum, have been isolated. GFP is an ideal reporter gene because it is completely non-invasive and can be used for qualitative and quantitative measurements of gene expression. GFP does not require any endogenous substrates and can be easily detected by fluorimetry. The GFP protein has an unusual B-barrel configuration and the fluorescence is due to a chromophore with a unique tripeptide structure found in the center of the barrel. GFP is still functional when fused in-frame with many other proteins. Such fusion proteins have been exploited to study intracellular protein trafficking, cytoskeletal dynamics, as well as to follow the movement of viral particles and cancer cells within an organism. We have heen using an enhanced GFP variant cloned into the plasmid vector pBAD-GFPuv (Clontech). This 5.4 kb vector has the GFP gene under the control of the P_{BAD} promoter which responds to L-arabinose. We plan to develop a unique set of plasmids which can be used in the teaching laboratory as tools for the study of gene expression. Specifically, we plan to engineer this vector to put the GFP gene under the control of the inducible promoters for heat shock and lactose.

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PRELIMINARY OBSERVATIONS OF SPERM/ NON-SPERM CELL ASSOCIATIONS IN ADULT MALE AND FEMALE PLATYFISH, *XIPHORPHORUS* MACULATUS.

Hugh Potter, Union County College, Cranford, NJ 07016 and Charles R. Kramer, College of Staten Island, Staten Island, NY 11304

The investigators will be examining the relationship(s) between sperm retained in the reproductive tract of the live-bearing female platyfish, *Xiphophorus maculatus* and the epithelial mucosa of the tract.

In members of the Family Poeciliidae the males transfer packages of sperm (spermatophores) to the female genital tract via an intromittent organ, the gonopodium. Once inside, these sperm will remain viable and capable of fertilizing the female's egg cells for several weeks following a single mating.

The retention and continuous viability of the male haploid cells within the female's body suggests a unique relationship between the herogenetic nature of the sperm and the female's immune response within the confines of the reproductive tract.

The study of this relationship may provide insight to the questions about certain forms of human infertility as well as the immunology of allograft transplantation.

THE RELATIONSHIP BETWEEN NESTLING GROWTH CHARACTERISTICS AND BROOD SIZE IN AMERICAN KESTRELS IN NEW JERSEY.

Jonas, J, M., and J.A. Smallwood. Department of Biology and Molecular Biology, Montclair State University, Upper Montclair, New Jersey 07043

The American kestrel (*Falco sparverius*) is the smallest falcon in North America. Our study was conducted on a wild population of kestrels breeding in northwestern New Jersey in 1998. Kestrels breed in nest boxes erected on trees,

barns, and power poles in suitable breeding habitat (open patches covered by short ground vegetation). We measured the body mass and feather growth of nestlings raised in broods of various sizes. Nestlings were marked to establish identity among their siblings. We then weighed and measured the nestlings every 2-3 days from the date of hatching until they were 22 days old, 5-6 days before fledging. Since fully grown female kestrels are about 8% larger than their mail counterparts, we analyzed male and female growth separately. We also pooled data into large broods (4-5 chicks/ brood) and small broods (1-3 chicks/brood) for comparison. We observed that female nestlings grew faster than male nestlings and reached a higher maximum mass than males as we expected. However, we found no difference in nestling growth patterns ad rates with regard to brood size. This suggests that prey abundance in the study area, and the adults ability to provision young, were not factors in the growth of the nestlings.

MATHEMATICS OF ACID-BASE TITRATION
Rony Jean-Baptiste, Marie-Ange Barreau, Jacques Saint-Ulma, Umesh Nagarkatte and Stanley Bajue, Departments of Biology, Physical Sciences and Mathematics of Medgar Evers College of CUNY.

The main goal of this project is to study mathematically the process of acid-base titration. In this series of titrations we study the data obtained in order to fit a mathematical function to the curve of the data. During the titration, data regarding the derivatives also are obtained. Once the mathematical function is obtained it is imperative that its derivative fits the derivative data. An acid-base titration can be carried out two ways, by adding base to acid or by adding acid to base. This choice naturally generates two sets of data and curves. The question then can be asked is whether the mathematical function obtained for one set can be modified by reflection or translation or some other process to the other data. The effects of changing the concentrations of the reactants on the set of data and on the mathematical functions as well as the effects of changing the volumes also were studied. The answer to these questions and the data obtained will be presented.

Rony Jean-Baptiste is a participant in the Biology-CSTEP of Medgar Evers College which is funded by grant 0516981085 from the NYS Dept. of Education.

A STUDY OF THE EFFECTS OF THALLIUM ON THE GROWTH OF THE CYANOBACTERIUM *ANACYSTIS NIDULANS*
Farah Sultana Khan

Anacystis nidulans is a unicellular cyanobacterium which is often times utilized as a means by which to gauge water pollution in the environment. Anacystis nidulans is particularly useful as an indicator of heavy metal contamination. The targeted heavy metals includes manganese, copper, mercury, selenium, cadmium, cobalt, lead, thallium, etc. The effects of the aforementioned heavy metals have been evaluated in our laboratory using *Anacystis nidulans* as an indicator.

In this particular study, various concentrations of thallium (0, 5, 10, 15, and 20 PPM) were inoculated into *Anacystis nidulans* cultures which were grown in 3M media. The growth of the inoculated cultures, as well as the growth of the control, were monitored by performing a direct count with hemocytometer, and turbidity study with spectrophotometer. The pH of the cultures and morphological changes of the cells in different concentrations of thallium are also studied. A concentration of 5 PPM of thallium proved to inhibit the growth of *A. nidulans* and it also has a cyanostatic effect on the cultures.

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INTRODUCING STUDENTS TO CONSERVATION GENETICS USING STURGEON CAVIAR
Kathleen A. Nolan[1], Phaedra Doukakis[2], Vadim Birstein[2], and Rob DeSalle[2] [1]St. Francis College, 180 Remsen St., Brooklyn, NY 11201,[2]American Museum of Natural History, Central Park West at 79th St., New York, NY 10024

We have done a comparative study of rapid DNA isolation techniques in an attempt to find a safer and speedier alternative to a traditional phenol/chloroform DNA extraction method (Maniatis et al., 1989). We have successfully isolated DNA from single sturgeon caviar eggs using three commercial kits, and a DTAB/CTAB method. We well give details of the DNAzol method available from Modern Research Genetics. Details for use of the other two DNA isolation kits available from Quantum and Genetra and the DTAB/CTAB method will be provided upon request.

In this laboratory exercise students will learn how to: A. Isolate DNA from individual sturgeon eggs (available at any local deli that sells caviar) using a DNAzol protocol, B. Set up a PCR reaction using primers that have been developed for DNA from sturgeon species and C. Employ electrophoresis and methylene blue and/or ethidium bromide staining to visualize the PCR products. This laboratory exercise would allow students to contribute to a growing DNA data base on endangered species.

CONSTRUCTION OF AN EXPRESSION VECTOR PEBFP-RAF CAAX TO STUDY PHOSPHORYLATION OF RAF-1 AND ITS ROLE IN SEROTONIN 1A RECEPTOR MEDIATED PROTECTION OF NEURONAL CELLS FROM HYPOXIC INJURY
Oleg I. Rivkin, Dr. Probal Banerjee[1,2] [1]Department of Neuroscience and [2]Department of Chemistry, College of Staten Island/CUNY, 2800 Victory Boulevard, Staten Island, NY 10314

Previous studies have shown that stimulation of the brain serotonin 1A receptor (5-HT_{1A}-R) causes protection of both hipocampal neurons as

well as a 5-HT_{1A}-R-expressing hippocampal neuron-derived cell line, HN2-5, from hypoxic injury. These studies have also shown that this neuroprotective action is through the activation of the Ras-Raf-1-Erk-2 pathway.Subsequent studies have also shown that 5-HT_{1A}-R stimulation also causes an inhibition of the apoptosis-causing caspase, CPP-32. However, it is not known how this activation of the Ras-Raf-1-Erk-2 pathway could alter mitochondrial events which are known to be connected to the activation of CPP-32. One possibility was that activated Erk-2 could cause feed-back phosphorylation of Raf-1 and, thereby, elicit release of hyperphosphorylated Raf-1 from the plasma membrane. This phospho-Raf-1 molecule could associate with the death agonist Bad, which is known to bind to and inactivate Bol-2- an inhibitor of apoptosis. The phospho-Raf-1-Bad binding could in turn cause an inhibition of Bol-2-Bad association, thus releasing Bol-2 and restoring neuroprotection. The studies of this laboratory have shown that 5-HT_{1A}-R stimulation does indeed case increased phosphorylation of Raf-1 and also enhanced association of phospho-Raf-1 with Bad. In this project we wish to understand if the release of phospho-Raf-1 from the plasma membrane are essential for the observed 5-HT_{1A}-R mediated neuroprotection. To address this point we prepared a cDNA construct for mutant Raf-1 with the membrane localization signal CAAX located at the carboxy terminal end. If the translocation of Raf-1 from the plasma membrane to the cytosol is pivotal for the protection, then transient transfection of HN2-5 cells with this construct would cause inhibition of the 5-HT_{1A}-R mediated protection of HN2-5 cells.

IDENTIFICATION OF THE TYROSINASE GENE MUTATION CAUSING ALBINISM IN BALB/c MICE.
Tawa T. Seabrook

Albinism in mice is a striking pigmentary disorder that may be caused by a point mutation at position 387 of the nucleotide sequence coding for the tyrosinase gene. The purpose of this experiment was to identify this mutation. First, DNA from the hearts and tails of 2 wild type and 3 female BALB/c mice was isolated using InstaGene®. Next, primers for the region surrounding the point mutation were developed and this region was amplified using the polymerase chain reaction (PCR). Third, the PCR product was purified using the phenyl-chloroform extraction/ethanol precipitation method and fourth, DdeI was added to this product. Results indicated the presence of the tyrosinase gene in all mice, but were inconclusive for the presence of the point mutation in the BALB/c mice.

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THE ACTIVATION OF JNK VIA PHOSPHORYLATION ON THE ONCOGENIC VAL-12 RAS P21 PATHWAY
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The high percentage of tumors caused by the hyperactivity of oncogenic ras p21 has been the impetus for extensive research on the ras oncogene and its products. The oncogenic ras p21 proteins have been found to play major roles in the development of various tumors, especially in pancreatic carcinomas (~98%) and in colorectal cancers (~70%).

Since ras p21 is known to play a regulatory role in eukaryotic cells in the cascade of biochemical processes known as signal transduction, many experiments have been aimed at studying the various effects of the naturally occurring mutations of the ras oncogene. Other investigations have studied the active regions of the p21 polypeptide which are involved in its protein interactions, as well as the mechanism of these interactions.

Recent reports have shown that the oncogenic ras p21 induces the activation of its own pathway which is distinct and independent from the normal pathways. It is now known that the oncogenic ras p21 forms a ternary structure with two other proteins, jun and jun N-terminal kinase (JNK). The aim of this project is to investigate the activation mechanism of JNK by oncogenic ras p21, reported in a previous in vitro study (Adler, 1995). Adler's results indicated that in vitro activation of JNK by oncogenic Val-12 p21involves the direct interaction and phosphorylation of a tyrosine residue on JNK. Our experiments, using the in vitro *Xenopus laevis* oocyte system, confirm these results.

In addition, further investigations were done to confirm that the oncogenic ras p21 pathway indeed relies on the overall activation of the transcription factor, jun. The apparent inhibitory effect of a double, dominant negative, mutant jun DNA, co-injected with Val-12 p21, suggests that ras p21 activity does rely on activation of jun.

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