



COLLEGE OF LIBERAL ARTS & SCIENCES

The Department of

BIOLOGY

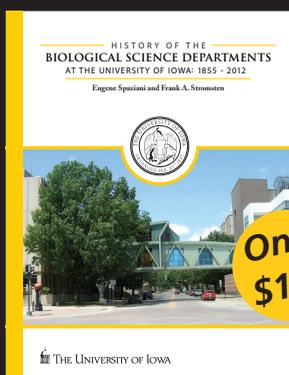
Summer 2014

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DATE!**
FRIDAY, OCTOBER 10

**BIOLOGY HOMECOMING
EVENT!**

Details coming
soon on our website.

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Dear Alumni and Friends of Biology,

With all that happened after the great flood of June 2008, it is hard to believe that it was only six years ago that I started my work as Departmental Executive Officer (DEO). Finishing up a 300-page long review of the department in May reminded me of all the accomplishments of this remarkable group of researchers and teachers.

For starters, in only six years we have replaced nearly one-third of our faculty while maintaining our excellence in teaching and research and staying at a high level of funding throughout these difficult times. Beyond that, the faculty published over 300 papers during this time with citations of their work reaching nearly 100,000. In parallel, the department has reorganized its Ph.D. program, driven by Dr. Joshua Weiner, former Associate Chair of Graduate Education, and is in the process of overhauling the undergraduate curriculum under the guidance of Dr. Bryant McAllister, Associate Chair of Undergraduate Education.

We are continuing and expanding our involvement with activities outside the department through leadership in several key positions. Dr. Dan Eberl maintains his leadership role as Director of the Interdisciplinary Graduate Program in Genetics, Dr. Josep Comeron is Co-Principal Investigator on a recently submitted National Institutes of Health (NIH) T32 training grant in Bioinformatics, and Dr. Michael Dailey was recently selected as Co-Director of the Interdisciplinary Graduate Program in Neuroscience. Dr. Steven Green, currently the top-funded investigator in Biology, is slated to become the Biology and College of Liberal Arts & Sciences representative for the new Pappajohn Biomedical Discovery Building — the flagship research building of the University of Iowa. The department also has two newly minted tenured associate professors in its ranks, Drs. Maurine Neiman and Albert Erives, and welcomes back full time, Dr. John Logsdon, after three years as Interim Director of the Pentacrest Museums.

I recently became the Director of both the Center on Aging and the Aging Mind and Brain Initiative (AMBI). The AMBI is currently looking to complete the hiring of five more faculty, including one in the Department of Biology, and excellent candidates were recently identified. The target of the AMBI is to identify early mental decline and delay progression through early intervention as well as finding cures for age-related pathologies such as Alzheimer's disease.

My own involvement in this research is targeting age-related hearing loss and vestibular dysfunction. Most intervention for mental decline follow the 'use-it-or-lose-it' paradigm, but this idea is difficult to apply for hearing as it is excessive noise that can cause the demise of hearing. However, in the balance (vestibular) system it appears that continued exercise sharpens not only the ability to sense position and movement in space but also allows for a better integration of movement sensing with motor control (balance). The optimal duration and intensity for self-generated movement and balance sensation remains to be evaluated in the vestibular system of the elderly.

Thank you for your continued support and interest in the Department of Biology.

Warm regards,

Dr. Bernd Fritzsich

Departmental Executive Officer (DEO) and Professor of Biology

Director, Center on Aging & Aging Mind and Brain Initiative (AMBI)

Featured Alumna

Melissa Smrz is a Former FBI Executive and Agent



Before coming to the University of Iowa (UI), Melissa Smrz spent a lot of time in Iowa City while her father was undergoing treatment at the University of Iowa Hospitals and Clinics (UIHC), allowing her to become very familiar with the campus and people. She recalls, “I wanted a comprehensive science education to prepare me for medical school or, as it turned out, a career in forensic science.”

After graduating in 1980 with a bachelor’s degree in zoology and a certificate in medical technology in 1981 – both from the UI, she went on to complete a master’s degree in criminalistics from the University of Illinois at Chicago in 1985. She then began her career as a scientist in forensic serology and microscopic hair analysis with the Virginia Bureau of Forensic Science in Roanoke, Virginia.

In 1989, Smrz started her career with the FBI as a Special Agent in Indianapolis where she investigated allegations of white collar crime violations such as financial institution, consumer, wire and mail, computer, bankruptcy, and federal government frauds. However,

most of her 20+ years in the FBI was spent in the FBI Laboratory as a forensic serologist and nuclear DNA expert. She subsequently served in several laboratory management positions and retired in January 2011 as a Deputy Assistant Director where she oversaw the daily operations of the FBI Laboratory consisting of nearly 700 scientists, special agents, and support employees.

She worked some high-profile cases including murders, sexual abuse and rape cases, and many others. To her, the most important cases involved the violation of people’s civil rights. Smrz says the zoology courses she took at the UI in genetics, evolution, and cell biology, prepared her well for understanding and applying concepts in her training and practice as a forensic serologist and forensic DNA analyst.

Smrz is now a part-time staff assessor for the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) in addition to being an independent forensic science consultant. In her free time, she enjoys spending time with her daughter Luda. She also likes to travel and watch the Hawkeyes. Smrz is very proud of her education at the UI Department of Biology and states, “I would not trade my undergraduate education at the University of Iowa for anything!”

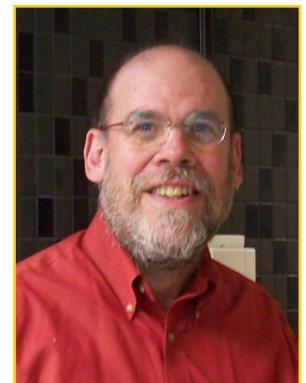
Professor Denburg Retires with over 35 Years of Service

By Dr. Gary Gussin, Professor Emeritus

Professor Jeffrey Denburg, who retired on June 30, 2014, came to Iowa in 1977 following the receipt of a Ph.D. from Johns Hopkins University (1970), a National Institutes of Health (NIH) postdoctoral fellowship at Cornell University (1970-72), and five years as a research fellow at Australian National University (1972-77). In Australia, he began his research on cockroach neurobiology and in his spare time coached a local basketball team.

Throughout his career, Denburg made notable contributions to all aspects of the department’s mission. His research focused on the way synapses formed in the nervous system and how neuronal processes in cockroach embryos regenerate following surgical damage. This work was supported continuously for more than 25 years by NIH. Along the way, he received a prestigious NIH Career Development Award (1979-84) and was director of the department’s NIH Program Project Grant on “Generation of Neuronal Form and Function” (1988-93). Manual dexterity and hours of dissecting neurons with watchmakers’ tweezers led to the development of many new techniques that he generously taught to colleagues. He was a pioneer in the department in using monoclonal antibodies to study how nerve axons “find” their target cells.

A dedicated teacher, he had an unusual ability to engage students in stimulating class discussions and intellectual give-and-take at all levels. His teaching contributions include the development of popular non-major courses (“Biology of the Brain” and “Scientific Basis of Biological Warfare”) and courses essential for the department’s Neurobiology track as well as participation in significant parts of the Introductory Biology course sequence for majors. His intellectual curiosity and willingness to entertain provocative, unconventional, and even bizarre concepts enriched his teaching and challenged his students. His inventiveness as a teacher often took the form of creative behaviors, including lecturing while roller-skating to demonstrate the brain’s ability to direct a multiplicity of human activities simultaneously. Red socks, sneakers, and outrageous ties characterized his lecture attire. Among his extensive departmental service activities, he directed the Biology Undergraduate Honors Program for 11 years, again reflecting his commitment to excellence in education.



He continues to be excited by the use of new techniques to understand brain function and the holistic relationship between the brain and behavior.

Send us your news and updated contact information! Send an email to biology@uiowa.edu or visit www.biology.uiowa.edu/alumni.php and complete the “Keep-In-Touch” form.

Making a Difference

Science as we know it is constantly changing. As a result, the Department of Biology has been proactive with adjusting its undergraduate and graduate curriculum, hiring new faculty, increasing interactions across campus, and expanding two major core facilities. These initiatives present a challenge with today's funding environment. Make no mistake, the University of Iowa and the Department of Biology are increasingly relying on private donations. Highlighted below are some ways you can help make a difference in our department and the education of our students.

How Your Support Can Help Make a Difference...

The Integrated Biology (I-Bio) Graduate Program

In order to better prepare students for the modern interdisciplinary and collaborative nature of scientific research, the department has recently revamped its graduate program, which is now called Integrated Biology (I-Bio) Graduate Program (see ibio.biology.uiowa.edu for more information). Through these recent changes, we are reducing the time to completing a Ph.D. degree to less than six years and are able to support up to six new graduate students per year. Although this structure accommodates a stable population of around 36 Ph.D. students, this number is still below what should constitute a robust graduate program for a department of our size. Private donations are, and have historically been, critical for securing the long-term financial viability of our graduate program. The department offers numerous and flexible opportunities to support outstanding graduate students through named scholarships, fellowships, and other awards.



The Biology Honors Program

The Biology Honors Program provides undergraduate students a well-rounded research experience that couples training in the lab with training in scientific communication. The program is very rigorous, requiring a minimum of two semesters (roughly 15 hours per week) of independent research, among additional requirements. Thus, typically only 15% of Biology majors will graduate with Honors in Biology. Year after year, Biology Honors students go on to careers in medicine, dentistry, and scientific research. Funds would be used to provide financial support for students and to cover research costs.



Research Seed Grants

A major problem in federal and non-federal funding is to provide research money for novel ideas that require preliminary work to test the feasibility before submission to an outside funding source such as the National Institutes of Health (NIH) or the National Science Foundation (NSF). Providing an annual competition for the best ideas could enhance the long-term stimulation of faculty research into novel areas that likely would provide unprecedented insights in years to come.

Infrastructural Improvements

One important aspect of modern biology is the need for cutting edge equipment. This need, is in part met by our two core facilities in the department, the Roy J. Carver Center for Genomics (CCG), and the Roy J. Carver Center for Imaging (CCI). However, with the rapid advances in technology, equipment becomes quickly outdated. Thus, regular replacement of existing equipment at the core facilities is paramount to keep the department at the cutting edge of science. Failure to do so will be a disadvantage to our faculty and will not provide the appropriate training for graduate and undergraduate students alike.



Endowed Professor Program

Endowed professors are among the highest honors a university can bestow on faculty. Several endowed and named professorships have been awarded to faculty in the Department of Biology such as the Iowa Entrepreneurial Endowed Professorship and the Roy J. and Lucille Carver/Emil Witschi Professorship of the Biological Sciences. Providing rewards beyond the name recognition and possibly generating new endowed professorships to acknowledge the excellence of some faculty would require an additional investment. This financial incentive would provide a goal for younger faculty to strive for recognition as an endowed professor.

To learn how gifts can make a difference for faculty, staff, and students in the Department of Biology, please visit www.givetoioowa.org/biology or contact Sara Ring at the UI Foundation (sara-ring@uiowa.edu, 319-467-3639).

Biology Professor Studies Possible Link to Human Cancer

Anna Malkova, Associate Professor of Biology, has received a four-year, \$1.3 million grant from the National Institutes of Health (NIH). The grant is a renewal of her previous work to study how cells repair DNA breaks. The repair of DNA breaks is crucial for cell survival. Unfortunately, imprecise or faulty repair can lead to various genomic instabilities including cancer.

An important focus of research in the Malkova Lab is a type of double-strand break repair pathway called break-induced replication (BIR). BIR is the main pathway to repair broken chromosomes containing only one repairable end. However, the repair by BIR can come at a high cost to the cells as it may lead to frequent mutations, chromosomal rearrangements, and copy number variations – all hallmarks of human cancers.

Recently, using yeast as a model organism, Malkova's group, in collaboration with Dr. Kirill Lobachev's research team from the Georgia Institute of Technology, provided an explanation for genetic instabilities resulting from BIR that was published in the October 17, 2013, issue of the journal *Nature*.

A more recent finding from Malkova's lab demonstrates that BIR is a source of genetic changes similar to those frequently found in human cancer. Specifically, recent studies from several groups have shown that cancer development frequently involves the formation of multiple mutations that arise simultaneously and in proximity to each other (mutation clusters).

The research completed by Malkova's lab in conjunction with the research group led by Dr. Dmitry Gordenin from the National Institute of Environmental Health Sciences provided a mechanism that can explain how mutation clusters associated with human cancers may form. It was shown that BIR promotes the formation of damage-induced mutation clusters in yeast. This finding was published in the June 12, 2014, issue of the journal *Cell Reports*.

In the future it will be critical to investigate BIR directly in human cells and to determine whether BIR can form clustered mutations that lead to cancer in humans. If this turns out to be true, it may lead to the discovery of new targets for developing therapies against human cancers, Malkova says.



Yeast colonies after the induction of a DNA double-strand break. Colonies in the bottom image show normal repair of DNA breaks. The red and white colonies in the top image show repaired DNA breaks by BIR associated with chromosomal rearrangements similar to those found in human cancer.