Programs

Graduate and undergraduate programs in biochemistry at The Ohio State University are designed to educate and equip students for research and teaching careers in biochemistry. With several departments participating in this program, the joint talents of more than 40 faculty members and extensive resources of modern equipment are combined to provide numerous opportunities for study in all branches of biochemistry.

Undergraduate Program

A program leading to the Bachelor of Science degree with a major in biochemistry is offered by the Academic Faculty of Biochemistry and Molecular Biology, College of Biological Sciences. The course of study emphasizes modern biochemistry based on a thorough foundation in biology, chemistry, and mathematics. The superior student has the opportunity to participate in an honors program which involves an original contribution through research.

Graduate Program

Graduate programs leading to Doctor of Philosophy and Master of Science degrees are administered through the Graduate School of The Ohio State University. Introductory courses in biochemistry for graduate students are taught cooperatively by members of the Academic Faculty of Biochemistry and Molecular Biology (College of Biological Sciences), and the Departments of Physiological Chemistry (College of Medicine), and Chemistry (College of Mathematics and Physical Sciences). Advanced course offerings in biochemistry in all three units are used to complete a broad and sound program. Courses are also available for the program in the allied fields of chemistry, physics, biophysics, pharmacology, physiology, and microbiology.
Research Areas

The student has a unique opportunity to choose his field of study from a broad spectrum of research areas in any of the participating departments. Several of the areas may be pursued in more than one of the departments with different emphases, depending upon a student's own interest or his goal. The breadth of research interests represented by the combined faculties can be observed by examination of the faculty listing in this brochure. Because of depth of representation, particularly attractive opportunities exist in the following areas:

Bioenergetics: of ion transport; of polysaccharide biosynthesis

Carbohydrates: analytical chemistry; structure of complex saccharides; synthesis and reactivity of simple sugars and nucleosides; biosynthesis of polysaccharides; metabolism of drug nucleotides; mucopolysaccharides; conformational analysis

Central mechanisms: hormone; allosteric; in nucleotide synthesis; in adipose tissue; antibiotic biosynthesis and mechanisms; mechanisms of drug action on the reticuloendothelial system

Enzymology: metabolic pathways; model systems and effect of metal ions; biophysical aspects; kinetics and mechanism; relation to protein structure

Lipids: biophysics; cellular organization and membrane structure; metabolism; in nutrition; biosynthesis

Neurochemistry: chemistry of gangliosides; information storage and retrieval; quantitative histochemistry in brain; chemical neuropathology

Nucleic acids: relation of structure to activity; functions in brain; differential reactivity of components

Nutritional biochemistry and biochemistry of food

Photosynthesis: photosynthetic processes; origins of life; photosynthesis; vision

Physical chemistry of biological macromolecules: protein structure; nucleic acids; casein micelles
Facilities

Research Facilities
The Ohio State University laboratory facilities are well equipped with modern instrumentation for research. In addition to the standard basic equipment available in the three departments, the specialized facilities range from outstanding spectroscopic equipment for the study of molecular structure to excellent facilities for the study of the biochemistry and function of molecules in normal and pathological conditions.

Library Facilities
Special libraries associated with the departments supplement each other with a collection of books and journals in biochemistry and allied fields. Through the close affiliation of the University with Chemical Abstracts Service, located near the campus, a comprehensive collection of current literature in biochemistry and chemistry is available.

Metropolitan Area
The Ohio State University is located in Columbus, the capital city of Ohio, a metropolitan community with a population close to one million. While enjoying the cultural, commercial, and civic advantages of a large city, Columbus reflects in many ways the friendly, informal atmosphere of smaller communities. Frequent musical, dramatic, and other cultural programs are presented in Columbus, and the city also offers a gallery of fine arts, the state museum of natural history, and a museum of science and industry. A wide range of sporting and outdoor recreational facilities is available in the Columbus Area. All of the major spectator sports are also available. The Columbus research community includes Battelle Memorial Institute, which is the world's largest non-profit scientific institute, located adjacent to the Ohio State campus.

Student Support
All graduate students in good standing are supported through teaching and research assistantships and fellowships throughout their program. The stipends are comparable with those at other schools and are in line with national standards. Tuition and out-of-state fees are waived. Support for post-doctoral appointments is also available.

Housing
Housing for single male students is available in a section of Steeb Hall reserved for graduate and professional students. Housing for women is available in Neil Hall. Apartments for married students are available at University Buckeye Village and in areas adjacent to the campus. Further information concerning housing may be obtained from the Student Housing Office, 309 Pomerene Hall.
Faculty/Research Interests

Addanki, Somasundaram, Assistant Professor, Physiological Chemistry, Ph.D., The Ohio State University (John T. Niles). Ion transport, acid base control mechanisms, and metabolic and endocrine disorders of cell and subcellular particles; redox enzymes in biochemical and clinical research.


Albin, James O., Associate Professor, Physiological Chemistry, Ph.D., University of Oregon (Stettina Rigas and Howard S. Mason). Postdoctoral, Johns Hopkins University (Albert L. Lehninger and Winstow S. Swaghey). Mechanism of the enzyme catalytic action of a single substrate system; spectroscopy; transition metals.


Boggs, Dallas E., Assistant Professor, Physiological Chemistry, Ph.D., Cornell University (H. H. Williams). Ion fluxes of amino acids and sugars, animal model systems for study of enzymes as replacement therapy for metabolic diseases such as histidinemia.


Brielley, Garland P., Professor, Physiological Chemistry, Ph.D., University of Maryland (F. P. Velich). Postdoctoral, University of Wisconsin (David E. Green). Mechanism of ion transport and its relation to structure in mitochondria.


Quantitative histochecmy of brain acid hydrolase enzymes in cerebrospinal fluid and brain clinical neuropathology of degenerative diseases.


Snell, Janus A. Professor, Biochemistry and Molecular Biology, Ph.D., University of Wisconsin (W. H. Perelson). Biosynthesis of lipopolysaccharides: mode of action of antibiotics and other drugs non-specific immunity: reticuloendothelial system: mechanisms in radiotherapy.


For Further Information

For further information concerning the biochemistry programs, inquiries should be directed to one of the following:

Dr. George Serif, Chairman
Academic Faculty of Biochemistry and Molecular Biology
The Ohio State University
2121 Fyffe Road
Columbus, Ohio 43210

Dr. Leon M. Dorfman, Chairman
Department of Chemistry
The Ohio State University
18 West 18th Avenue
Columbus, Ohio 43210

Dr. David G. Cornwell, Chairman
Department of Physiological Chemistry
The Ohio State University
410 West 10th Avenue
Columbus, Ohio 43210

For admission application blanks, write:

Admissions Office
The Ohio State University
190 North Oval Drive
Columbus, Ohio 43210
4 OSU programs rated below average

By MARILYN GREENWALD

Four Ohio State University departments were rated slightly below average in a survey conducted on the quality of doctoral programs in the biological sciences at major U.S. universities.

The same survey also gave two OSU departments—zoology and botany—above-average scores.

The survey was conducted over two years and covered 616 doctoral programs. It was conducted by the Associated Research Councils, which is made up of the National Academy of Sciences, the American Council of Learned Societies, and other national educational groups.

The study evaluated doctoral programs by assessing the quality of faculty, the effectiveness of programs and improvement over past years. Criteria included size of graduate faculty, library holdings and success of graduates in finding jobs.

Scores are based on how far above or below each department was from the mean score of 50.

Following is a summary of how OSU graduate biological sciences programs fared in the study:

- **Biochemistry** — 48 in faculty quality and 45 in department effectiveness. The university's physiological chemistry department was given a 46 in faculty quality and a 44 in effectiveness.
- **Botany** — 53 in faculty quality and 54 in effectiveness. The plant pathology department was given a 48 in faculty quality and a 49 in effectiveness.
- **Cellular and Molecular Biology** — 41 in faculty quality and 40 in effectiveness.
- **Microbiology** — 45 in faculty quality and 47 in department effectiveness. OSU's doctoral program in medical microbiology and immunology earned a 47 in faculty quality and a 45 in program effectiveness.
- **Physiology** — 44 in faculty quality and 41 in program effectiveness.
- **Zoology** — 55 in faculty quality and 54 in program effectiveness.

Jules LaPids, dean of OSU's graduate school, said that the numbers in the survey show that "most of the departments (at OSU) seem to be at the high end of the adequate range."

He said the surveys used the term "average" in a statistical sense. A score of 50 means that a university has a high-quality department.
Safe insecticides to combat mosquito problem

By DAVID MOORE
Lantern staff writer

Take a single-celled blue-green algae, add a poison-producing bacterial gene, mix well, and voila -- a meal that could rid us of the pesky mosquito.

The mosquito is responsible for the some of the worst diseases known to man, said Donald Dean, associate professor of biochemistry and molecular genetics.

Dean, in a effort to combat the mosquito problem, is cooking up a strange dish in his research laboratory in the department of biochemistry.

One part of his recipe is microscopic blue-green algae that by itself is harmless to mosquitoes. The second part is a gene, located in the bacteria Bacillus thuringiensis, that produces a protein poisonous to them.

When the gene is placed inside the walls of the algae, it becomes deadly to mosquitoes and harmful to gnats, Dean said.

He said the protein has been tested on everything from man to oysters and has been found harmless to all other organisms.

THE ALGAE is a part of a mosquito's diet when it is in its larval stage, before it develops into an adult.

When the larvae ingest the algae, they die.

While mosquitoes can develop a resistance to the poisons used in insecticides, they cannot resist the proteins the bacteria manufactures, Dean said.

Biological insecticides, containing proteins produced by bacteria, are now being widely used across the United States and Canada.

Although the biological mosquito killers seem like the answer to the camper's dream, the insects have their limitations, Dean said.

One limitation, he said, is that the insecticides last only two days after being sprayed in the environment.

"Ecologically, that's beautiful," Dean said. "You put it out there and it's gone.

The bad part is if you put it out there in the environment and it's gone in two days, you have to make a new application. This is very expensive in the long run," he said.

DEAN IS TRYING to prolong the life of the biological pesticides by placing them inside blue-green algae.

He said his lab will attempt to combine the blue-green algae with the insecticide-producing gene in the next six months.

John Briggs, professor of entomology, said, "He's making varieties of organisms that didn't exist before."

Amulda Chakraborty became the first man to patent an organism in 1980, when he patented a bacterium that would "eat up" oil spills, Dean said. Chakraborty is a professor of microbiology and immunology at the University of Illinois.

Dean already has three patents for organisms and has two more in the works.

There have been heated debates in society about unleashing new microorganisms into the world, Dean said.

Albert Ge, a graduate student from the People's Republic of China who works in the lab with Dean, said, "Now people are more comfortable with (genetically-engineered organisms) that you can use."

DEAN SAID, "The question is, if we introduce these (toxic) blue-green algae, would they take up residence in the environment? What effect will this have on the mosquito population?"

There has been a study on (the bacteria) and its effects on the food chain. This microbial pesticide has a very small effect," he said.

"We would have to be sure that the massive reduction of mosquito populations would not affect the food chain," Dean said.

He said he thinks the organism will reduce but not eliminate the mosquito population.

More than anything else, Dean wants to eliminate the use of chemical pesticides.

"I think chemical pesticides are insidious weapons that we are turning against ourselves," he said. "Not only do they turn against other forms of life, but ultimately they affect man too."

Dean said biological pesticides are cheaper than chemical pesticides because they kill only the specific pest.

"They don't cause extensive damage to the food chain," he said.

CONVENTIONAL insecticides usually destroy all the pests in their paths, Dean said.

Biological pesticides have also been used against the cotton bollworm and the corn rootworm, Dean said.

Briggs said, "The concept is more than a century old. ... It's been in the last 10 years that work has been really moving along as far as mosquitoes."

The bacteria that kills mosquitoes is very easy to replicate, Briggs said.

"It's like breeding bees," he said. "In other words, you have some carbohydrate source and a protein source, such as cottonseed meal and molasses, then place the bacteria in the mixture and the bacteria replicates."
DIRECTOR NAMED TO LEAD OHIO STATE BIOCHEMISTRY PROGRAM

COLUMBUS, Ohio – Dr. Donald Dean (43214) has been named director of the biochemistry program at The Ohio State University.

The biochemistry program is an interdisciplinary graduate program comprising seven colleges at Ohio State, including agriculture, biological sciences, dentistry, engineering, mathematical and physical sciences, medicine and public health, and veterinary medicine. Dr. Fred Sanfilippo, senior vice president and dean of health sciences at The Ohio State University College of Medicine and Public Health, appointed Dean to this position.

Dean has been the associate director of the biochemistry program at Ohio State since 1999 and has had joint appointments in the departments of molecular genetics, entomology and biochemistry; and he has taught in the departments of microbiology and biochemistry during his 26-year tenure at Ohio State. Also, Dean has authored or co-authored 106 journals or publications of research and is currently a funded researcher by the National Institutes of Health.

Dean has a Ph.D. from the University of Michigan in cell and molecular biology and a master’s degree in biology from Texas Christian University.

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