Sonneborn Lecture 1998

A Symposium in honor of

John R. Preer, Jr. and Louise B. Preer

October 23, 1998

Program

Symposium - Jordan Hall A100, 1:30 pm

Introduction: Ching Kung, University of Wisconsin

Jim Forney, Purdue University
Regulation of Developmentally Controlled DNA Elimination in *Paramecium*

Eric Meyer, École Normale Supérieure, CNRS, Paris
Chromosome Fragmentation and the Control of Genome Amplification in *Paramecium*

Refreshment Break - 3:20 pm

Meng-Chao Yao, Fred Hutchinson Cancer Institute
Chromosome Down-sizing and Re-structuring in *Tetrahymena*: Mechanism and Implications

John Preer, Indiana University
rDNA of *Paramecium*: Evidence for Rolling Circle Replication

Reception - Jordan Hall Atrium, 5:30 pm

Dinner - Jordan Hall Atrium, 6:30 pm

After Dinner Toasts and Roasts - Barry Polisky, Bertie Preer, and others

John R. Preer, Jr.

With very few exceptions, eminent scientists of retirement age have been away from the laboratory bench for many years. The responsibilities of running and funding a large, successful group, combined with the unpredictable long hours of experimental work—to say nothing of staying abreast of new technical developments—all take their toll and almost always move the successful professor out of the lab into the office, where by middle age he or she assumes a more managerial role. Senior workers who do experiments themselves are rare; those who implement the latest experimental technology with their own hands are virtually non-existent. People who can do this are special. John R. Preer, Jr., distinguished professor of biology, is one of these special people.

Preer's is a personal and scientific success story directly from Frank Capra central casting. As a kid growing up in Florida during the depression, he collected insects. During his high-school days he worked for a scientist at the University of Florida by classifying thrips, an insect found in grasses. He became sufficiently knowledgeable about thrips for his work to become known internationally. A species and a genus of thrips bear his name. This is a rather remarkable achievement for a high-school student.

Preer enrolled in the zoology department at Indiana University to study taxonomy with Kinsey, who worked on gall wasps. However, a course given by the dynamic young geneticist Tracy Sonneborn altered his plans, and he began to work in protozoology. His life took another unexpected turn when he was drafted soon after Pearl Harbor. Before leaving Bloomington he married his graduate-student colleague, Bertie Brandau, who subsequently became his lab partner for life. He spent four years in the U.S. Army and Army Air Corps, stationed in England and in Texas.

After the war he returned to Bloomington to finish his graduate work. This work involved an analysis of the killer character in *Paramecium,* a phenomenon that had been discovered by Sonneborn. Certain strains of *Paramecium* can kill other, sensitive strains. What made this phenomenon remarkable was that the killer genes were not in the nucleus, where all genes known at that time resided. Instead, these genes showed a cytoplasmic form of inheritance that seemed to challenge accepted ideas about genetics. Preer worked on this problem after he left Bloomington to take a position in Philadelphia at the University of Pennsylvania. He worked on this problem for the next thirty years, ultimately showing that the killer trait was due to unusual bacterial endosymbionts that lived in the cytoplasm of *Paramecium.* During this time he also began to study the surface antigens of *Paramecium,* a group of distinct genes whose expression was under complicated control. In 1968, Preer left Penn to take a position at Indiana in the department of his mentor, Sonneborn. The presence of these two scientists in the same place meant that Indiana was the acknowledged world center for work on the genetics of Protozoa. After his return to Indiana, Preer also continued his work on endosymbionts.

As molecular biology revolutionized experimental approaches to understanding control of gene expression, Preer learned new techniques and adapted them to his work. An inveterate tinkerer who loves to build and repair things (from musical instruments to scientific equipment) he is not one to direct his co-workers to undertake new techniques without trying them himself. Some of these efforts have led to dramatic discoveries, as in 1985, when he, Bertie, and their associates Bertina Rudman and Audrey Barnett found that the genetic code, universal for all previously described nuclear genes, was unexpectedly different in *Paramecium.* Even more recently, he and co-workers have developed a new method of introducing genes into *Paramecium* a method which promises to accelerate greatly the rate at which basic molecular questions can be studied in this organism. It is likely that Preer is on the verge of doing some of the most interesting and important work of his career.

In 1976, Preer was elected to membership in the National Academy of Sciences, and shortly thereafter was made distinguished professor of biology. He also served as chairman of the biology department from 1977 to 1980.

Throughout all this, he and Bertie have raised two kids and a series of German shepherds, learned to sail, ground the mirror for a twelve-inch telescope, fixed hundreds of broken toys, household items, and pieces of scientific equipment, invented innumerable new ways of doing things, maintained a huge greenhouse for growing orchids, learned how to program the Macintosh, and generally seemed to have a great time. Preer brings a rare combination of deep insight and hands-on ability to everything he does, regardless of project size. His and Bertie's attitude towards life and work and colleagues seems almost too sappy to be true, somewhat like a Frank Capra movie. But it isn't sappy. It's the way they really are. Since they have become molecular biologists, retirement is out of the question, since there is too much work to do. It can be expected that retirement will alter their lifestyle rather minimally. Certainly, it could not improve it.

-Written by Barry Polisky, on the occasion of John's retirement, 1988

Louise B. Preer

Louise Bertha Brandau (Louise to her family, Bertie to everyone else) was born in the East side of Baltimore, MD in a row house with marble steps. After high school her short career as an accountant in a saddle shop was thrown into confusion by receiving a scholarship from the Baltimore Eastern High School Alumni Association. Although the total scholarship of $200 was for but one year and a year's tuition at Goucher was $250, and although her only other source of funds was what she could earn, she decided to make the plunge. Were it not for the scholarship and for the NYA (National Youth Administration) work programs, she would probably still be in a saddle shop.

At Goucher she soon became fascinated with the work of a young faculty member, Ralph Cleland, who was unravelling the peculiar cytogenetics of the evening primrose. Cleland himself had worked on evening primroses with Hugo DeVries, a pioneer in the young science of genetics, inventor of the word "mutation" and one of the rediscoverers of Mendelism. On the year she finished her undergraduate work Cleland decided to accept a position as head of the Department of Botany at Indiana University, and Bertie followed him to Bloomington as his research assistant and began graduate work. There she met her future husband who was a graduate student in the Department of Zoology and they were married two years later just before the United States entered World War II. The war years were spent writing and working on her evening primroses either in Bloomington or while following her husband from one army camp to another when he was not overseas. In 1947 the Preers completed their Ph.D. Degrees in Bloomington and began a 20 year stay at the University of Pennsylvania. In 1967 they returned to Bloomington where they have remained.

Bertie's work on evening primroses consisted of the unravelling of the phylogenetic relations within a group which had undergone reciprocal translocations. Relations were determined by making appropriate crosses between races and counting the numbers of rings and pairs of synapsed chromosomes at meiosis. Then the characteristic end arrangements of each of the chromosomal complexes making up the race and their evolutionary origins were deduced. Most of her career, however, she spent working on the bacteria, viruses and plasmids found in the protozoan *Paramecium*. She delighted in the unravelling of the symbioses within symbioses found there (to quote Hegner, "all fleas have lesser fleas to bite 'em and so on *in finitum*"). At one point she made one of these bacterial symbionts, called "alpha", that lives only in the nucleus, her special project. Only occasionally did she work or publish by herself, however. Later when the molecular biology of nucleic acids became the obsession of most geneticists, she made it her obsession as well. When the odd genetic code that was to prove characteristic of many one-celled animals was found, she had the satisfaction of knowing that she had put in many long and late hours using the laborious methods in use at the time, personally sequencing many thousands of bases among which the occasional odd codons were discovered.

She never availed herself of the numerous opportunities she had to become involved in the formal training of undergraduates. Nevertheless, she was a mainstay in the training of the many graduate and undergraduate students who passed through the laboratory.

To understand Bertie's career one must understand a few things about her. First, the welfare of people always comes first, before research, before leisure, before the conventional and easy path of action. Second, whatever is done must be done right, no matter how difficult, no matter how laborious, no matter how obnoxious, with no short cuts and no compromises. And whatever she does, she does it in a responsible, sympathetic, outgoing, optimistic and cheerful way. During the war years her first child arrived, and her second and last came a few years later. When the youngest began school she joined her husband in the laboratory at the University of Pennsylvania. However, when school was out every afternoon she was home, for the children came first. As far as they could tell, she never left for work. As they grew older, Bertie spent

more and more time at work. When the youngest left home for college she became a full time laboratory worker.

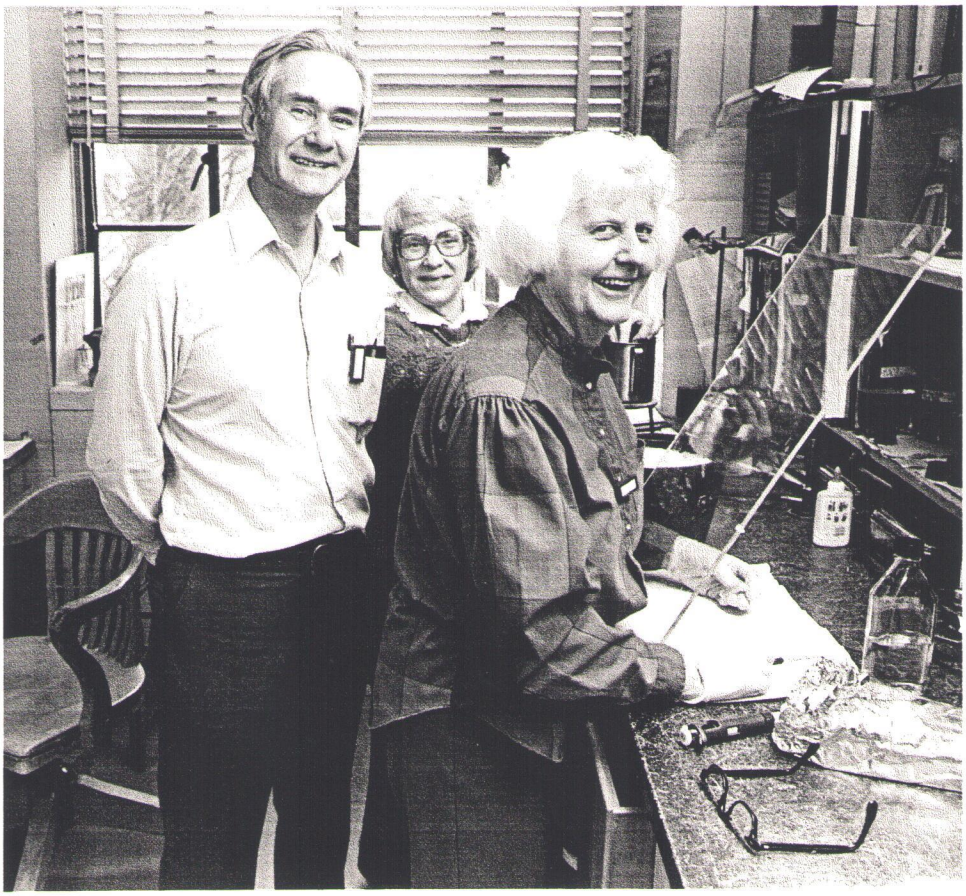
Although she is concerned about the status of women, she has never been an outspoken advocate of women's rights. She did chafe, however, in the early days when she was told that anti-nepotism rules forbade her being paid for her work, even from government research grants. It didn't seem right not to be paid at all when others along side her were being paid for doing less. In fact her presence in the laboratory provided the insight and continuity that was necessary for the research to proceed without interruption. Indeed, without her it would have withered to zero for many a protracted period when her husband was distracted by other academic duties. Finally, in the last 10 or 15 years the anti-nepotism barriers were dropped, she was appointed a Senior Research Scientist at Indiana University, and her compensation remained constant, though still far less than "equal pay for equal work".

I don't believe that she has ever really wanted an independent career. The people in her life have always been more important to her than a career. I think that she has always sort of liked the way things were. Bertie finds what she wants by simply doing research in the laboratory and worrying about the welfare of those about her. She exhilarates in the excitement of experiments that work, says "oh, well" for the experiments that don't. Only rarely does she embark on endeavors entirely on her own. A few times she has, but has always decided that collaboration suits her better. Once at the University of Pennsylvania she thought that her collaborators were headed in the wrong direction, and decided to embark on a new project all alone. She was so successful that the others in the laboratory changed to the new line of investigation that she had begun. Usually, however, she has been able to exert her influence by persuasion.

Her avocation of growing orchids provides her with great satisfaction, for she has always been a botanist as heart. Her hobby has also provided her many friends with abundant gifts of her prized orchids. Birthdays, minor celebrations, sickness, bad luck, or just being deserving in her eyes are all that one needs to qualify for a flower. Position in life is irrelevant, the most menial of workers is just as likely to receive an orchid as one at the top of the social ladder.

Finally, nothing that a friend needs is too much trouble for Bertie. For the sick she will be there. If a need is expressed that she can supply, it will be met. Even if the Grim Reaper is making a visit to the friend, she will stay, providing anything that might help, whether it be reading, talking, listening, preparing tasty dishes, even to the changing of bedpans. We won't miss her at IU because she will still be here working away in the laboratory!

-Written by John R. Preer, Jr, on the occasion of Bertie's retirement, 1989



John and Bertie Preer, with Bertina Rudman

This is a publicity photo taken in 1985, when the Preer lab discovered that the genetic code in *Paramecium* is different from that in most organisms. In *Paramecium*, only one codon specifies a stop; the other two canonical stop codons specify glutamine.

THE SONNEBORN LECTURES

Friends of the late Tracy M. Sonneborn have established a lectureship in his memory. This symposium represents the 18th year of the lectureship.

Aside from a few years at Johns Hopkins University, where he received the Ph.D. degree, Tracy Sonneborn spent his entire career at Indiana University. His devotion to the study of *Paramecium* established him as the world leader in biology and genetics of the Protozoa; indeed it is no exaggeration to say that he founded the modern era of study in these areas. Throughout his lifetime, he continued to make major discoveries influencing broad areas of research in genetics and cell biology. With precision, thoroughness, and infectious enthusiasm, he contributed unstintingly to teaching at Indiana University. In spite of the many attempts to entice him away, he remained loyal to IU, finding here the environment he thought was best.

Support for this lecture has been provided by the Sonneborn Lecture Fund, USPH Training Grant in Genetics, the Howard Hughes Medical Institute, the Department of Biology, and the Molecular Biology Institute, Indiana University.

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Credits: Cover photograph courtesy of Dr. Carlos Miller. Thanks to Jennifer Jones for reception and dinner arrangements, and Fred Drescher for program preparation.