



John D. Biggers, PhD, DSc (1923-2018)

John D. Biggers, one of the true pioneers of our field, passed away at his home in Lexington, Massachusetts on April 7. John was a founding member and second president of SSR, as well as serving as editor of *Biology of Reproduction*, and received the SSR Carl G. Hartman Award in 1987. His scientific career spanned over six decades.

John was born in Reading, England in 1923. He graduated from the Royal Veterinary College and obtained his PhD from the University of London. He then moved to the University of Sydney in Australia to take up a post in Veterinary Physiology where he investigated estrogen signaling and developed estrogen assays in collaboration with Peter Claringbold in the department headed by Clifford Emmens. This period helped establish John's lifelong passion for statistical and biometric analysis.

In 1955, John Biggers returned to England, taking a faculty position at the Royal Veterinary College at the University of London, where he embarked on studies of tissue culture, initially focusing on organ culture of bones. The development of media for long-term growth of embryonic bones in vitro established one of the research themes that drove his entire career—the development and optimization of chemically-defined culture media.

Anne McLaren was also in London by this time and their complementary interests led to an historic collaboration. Their 1958 *Nature* paper, “successful development and birth of mice cultivated in vitro as early as early embryos,” provided the first demonstration that embryos that had developed in culture could produce normal offspring, which was one of the most important advances for experimental embryology and the eventual development of clinical assisted reproduction technologies.

In 1959, John moved to the US, where he held faculty positions at the University of Pennsylvania and The Johns Hopkins University before being appointed Professor of Physiology at Harvard Medical School in 1972. During the 1960s through early 1980s, he published extensively on the metabolism of preimplantation embryos and regulation of oocyte maturation, with trainees and collaborators who included Ralph Brinster, Wes Whitten, David Whittingham, Dale Benos and many other well-known reproductive biologists. During this time, he also established methodologies for analysis of the preimplantation embryo and egg microenvironment in a long-lived collaboration with the biophysicist Claude Lechene and with Henry Leese.

The mid-1980s saw the establishment of the National Cooperative Program on Non-Human In Vitro Fertilization and Preimplantation Development under the leadership of Dick Tasca at the US National Institutes of Health. It was within this program, informally called the “Culture Club,” that the first media capable of supporting complete preimplantation embryo development from fertilized eggs to blastocysts were developed. Biggers' KSOM medium, which was developed in an extensive series of investigations with his postdoctoral fellow Joel Lawitts that employed sophisticated statistical optimization techniques to drive medium formulation, is widely used today and is the basis for successful human clinical IVF culture media. The importance of the Culture Club, in particular the Biggers laboratory, to the success of Human Assisted Reproductive Technologies (ART) cannot be overstated.

John Biggers was also very much interested in the ethics of ART and wrote and lectured extensively in this subject. He was called to testify before the US Senate about IVF and embryo transfer and appointed by President Carter as Chief Scientific Advisor on the Ethics Board of the US Department of Health, Education and Welfare.

John remained active in research until the end of his life. Most recently, he had an active collaboration with Mehmet Toner to develop methods of long-term storage of mouse sperm and had just completed a book chapter with his collaborator, Catherine Racowsky. Only two years ago, he and his co-author Carol Kountz published a book on Walter Heape, who was an underappreciated pioneer in the field of reproduction who had performed the first successful embryo transfer at the end of the 19th century.

John travelled extensively including all seven continents, often with his wife, the late Betsey Williams. He was an excellent cook and a passionate bird watcher and photographer. He will be remembered as a valued collaborator, a superb mentor who trained many of our top researchers, and a talented scientist whose work includes some of the most important advances made in the field of reproduction.