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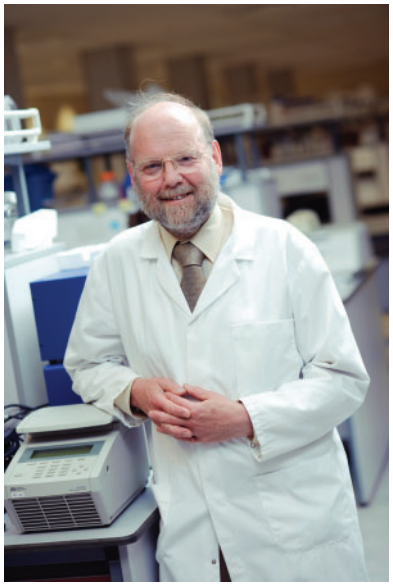
Recipient of the 2011 IETS Pioneer Award: Sir Ian Wilmut, PhD

Ian Wilmut was born on 7 July 1944 in Hampton Lucy in Warwickshire, England. He received his Bachelor of Science degree with specialisation in animal physiology from Nottingham University School of Agriculture in 1967 and his PhD from Darwin College of Cambridge in 1971. Dr Wilmut worked under the mentorship of Professor G. E. Lamming at the University of Nottingham where he was captivated by the area of mammalian embryology. This was the beginning of his professional life's dedication to livestock improvement through genetic engineering of animals. Dr Wilmut worked on his PhD degree with Professor Chris Polge, FRS, at the Darwin College of Cambridge, using pigs as a model for semen cryopreservation. His research on deep-freezing to preserve boar semen involved studies to examine the influence of diluent composition, glycerol concentration and methods of thawing on survival of spermatozoa.

At the time, Cambridge was the preeminent place for research on cryopreservation of mammalian reproductive cells. After finishing his doctoral research, Dr Wilmut accepted an MMB post-doctoral fellowship with Professor E. J. C. Polge, FRS, and Mr L. E. A. Rowson, FRS, at the ARC Unit of Reproductive Physiology and Biochemistry at Cambridge. His work led to the development of the first methods for cryopreservation of mammalian embryos. After preliminary work on mouse embryos he began studies on freezing cow embryos. Dr Wilmut obtained the world's first calf (named Frosty) from a frozen thawed embryo in 1972 (*Veterinary Record* **92**, 686–690, 1973). Following 6 days of storage in liquid nitrogen, the blastocysts were thawed and cultured and then surgically transferred to recipients resulting in one calf. Almost 40 years later, hundreds of thousands of cattle embryos have been frozen and thawed resulting in normal calves. Embryo transfer practitioners around the world routinely practice this pioneering methodology.

Following his work at ARC, Ian Wilmut became a Senior Scientific Officer at the AFRC/BBSRC Animal Breeding Research Organisation in the Institute of Animal Physiology and Genetics Research in Edinburgh, Scotland, in 1973. He has lived there with his family in the Scottish countryside ever since. Dr Wilmut's initial primary research focus at AFRC was on the identification of developmental and physiological causes of prenatal death in sheep and pigs. His experiments on the influence of uterine environment on sheep embryo development using asynchronous transfers became a solid basis for successful embryo transfer in ruminants. Dr Wilmut's experiments provided new knowledge regarding the cause of embryonic death, implantation failure and the uterine environment (*J. Reprod. Fertil.* **61**, 179–184, 1981).

While at Roslin, Dr Wilmut studied human therapeutic proteins produced in the milk of transgenic sheep in a project that was co-led with Dr A. J. Clark. The technology they developed was transferred to PPLTherapeutics in 1989–90 (*Biotechnology (N.Y.)* **7**, 487–492, 1989). In 1996, Dr Wilmut



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became the leader of a research group that focussed on the factors regulating embryo development after nuclear transfer. Dr Wilmut's systematic study of factors influencing development of cloned embryos established the first methods to produce offspring after transfer of nuclei from adult somatic cells. Dolly, the first clone produced from adult somatic cells was born in 1996 (*Nature* **385**, 810–813, 1997). Subsequently, new methods for nuclear transfer from somatic cells were used to introduce precise genetic changes into sheep (*Science* **278**, 2130–2133, 2038–2039, 1997). He carried out studies to understand the basic mechanisms that regulate development of cloned embryos and to improve the efficiency of nuclear transfer and to develop biomedical applications of nuclear transfer procedures. These include the provision of organs for xenotransplantation, the derivation of human cells for therapy and the cloning and modification of animals in agriculture (*Nature Biotechnol.* **7**, 744–745, 2003).

The production of Dolly has been described as the single most significant development in reproductive and developmental biology in the last 100 years. This discovery and the subsequent paradigm change in our thinking regarding reprogramming of a cell's nucleus have ushered in a new era in cell and developmental biology. A tremendous amount of new knowledge and understanding of cell differentiation and the genetic control of development has resulted and continues to result from these pioneering studies.

In 2000, Dr Wilmut became Head of the Department of Gene Expression and Development at the Roslin Institute, and also served as a Scientific Advisor for Geron Bio-Medical.

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Dr Wilmut left the Roslin Institute in 2005 to join the University of Edinburgh as Professor where he became the Director of the Scottish Centre for Regenerative Medicine in 2006.

Ian Wilmut has published more than 130 refereed original publications and 45 chapters in books and conference proceedings. He has received numerous awards and recognitions including the OBE, Queen's birthday honors, 1999; Knighthood New Year Honors, 2008; Fellowship of The Academy of Medical Sciences, 1999; Fellow of Royal Society of Edinburgh, 2000; Fellow of The Royal Society, London, 2002; AETA Pioneer Award, 2003; Foreign Associate of the National Academies of Science, 2004; Fellow Deutsche Akademie der Naturforscher Leopoldina, 2005; The Lord Lloyd of Kilgerran Prize, 1998; Sir John Hammond Memorial Prize, Society for Study of Fertility, 1998; Golden Plate Award, Academy of Achievement, 1998; Research Medal, Royal Agricultural Society of England, 1999; Sir William Young Award, The Royal Highland and Agricultural Society of Scotland, 1999; The Scotsman Innovator of the Year Award, 2001; Ernst Schering Research Foundation Prize, 2002; Honorary Fellowship of the Royal Medical Society, 2002; Paul Ehrlich and Ludwig Darmstaedter Award, 2005; and Shaw Prize, 2008. He has also received honorary doctoral degrees from University of Nottingham, 1998; Northeastern University, Boston, USA, 1999; Edinburgh University, 2002; Kuopio University, 2006; and Michigan State University, 2007.

Dr Wilmut served as President of IETS in 1994 and serves as the Editor-in-Chief of the journal *Cellular Reprogramming*, and as a Member of the Board of the International Society for Stem Cell Research since 2004.

Ian Wilmut is recognised as the 'father' of Dolly, the first animal to develop after nuclear transfer from an adult cell, and he is a pioneer in the science of cloning. One of Dr Wilmut's distinguishing characteristics is his unrelenting pursuit of new knowledge. He has dedicated his life to the improvement and the mainstreaming of embryo-related technologies into livestock production around the world. Therefore, in recognition of the significant contributions he has made over the last 40 years to the international scientific, academic, medical, veterinary, embryo transfer and biotechnology communities, the IETS is proud to award Sir Ian Wilmut with the 2011 Pioneer Award.

Matthew B. Wheeler, PhD

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