Sir Ian Wilmut, PhD

Sir Ian Wilmut is a Scottish embryologist who in 1996, was the first to clone a mammal, a Finn Dorset lamb named Dolly, from fully differentiated adult mammary cells. Wilmut's work, published in 1997, pushed the concept of cloning into the news and public debate.

He is currently Director of the MRC Centre for Regenerative Medicine at the University of Edinburgh. He is best known as the leader of the research group that in 1996 first cloned a mammal from an adult somatic cell, a Finnish Dorset lamb named Dolly. He was granted an OBE in 1999 for services to embryo development. In December 2007 it was announced that he would be knighted in the 2008 New Year Honours.

Wilmut, born in Hampton Lucey, England, attended the University of Nottingham for his undergraduate work. In 1971 he received a Ph. D. in animal genetic engineering from Darwin College of University of Cambridge. In 1974, he joined the Animal Research Breeding Station in Scotland, which is now known as the Roslin Institute, and has conducted research there ever since.

Wilmut's thesis at Darwin College was on the freezing of boar semen. In 1973, he created the first calf ever produced from a frozen embryo, which he named Frosty.

In the mid 1980's while working on a project involving the insertion of genes into sheep embryos, Wilmut heard a rumor of Steen Willadsen's unpublished success of cloning cattle from differentiated embryo cells. After confirming the rumor, he turned his attention to the process of cloning, which was a much easier alternative to the laborious task and high failure rate of manually inserting genes into embryos.

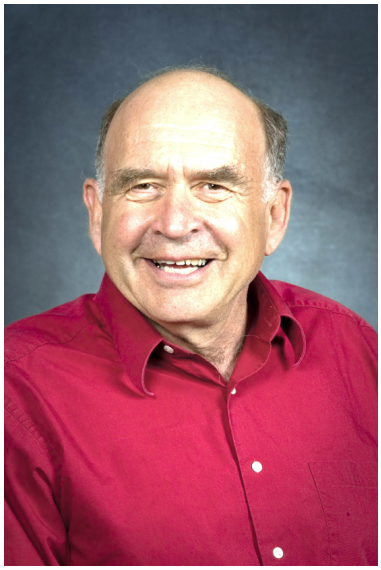
In 1990, Wilmut hired cell cycle biologist Keith Campbell to assist in his cloning studies. Their work produced its first success with the 1995 birth of Megan and Morag, two Welsh mountain sheep cloned from differentiated embryo cells. In their success, Wilmut and Campbell pioneered a new technique of starving embryo cells before transferring their nucleus to fertilized egg cells. The technique synchronized the cell cycles of both cells and their results led Wilmut and Campbell to believe that any type of cell could be used to produce a clone.

On July 5, 1996, Wilmut and Campbell used the same process to produce the first clone from adult cells, a Finn Dorset lamb named Dolly, after Dolly Parton. The announcement rocked the scientific community as well as the public, and kicked off a large-scale debate on the ethics and direction of cloning research.

Wilmut and Campbell continued their studies, and in 1997 created Polly, a sheep cloned from fetal skin cells that had been genetically altered to contain a human gene.

Wilmut, who states that he sees no reason for the pursuit of the first cloning of a human, conducts his research with the hopes of producing animals that act as manufacturing plants for valuable human proteins, which are costly and difficult to produce in large amounts elsewhere.

George E. Seidel, Jr., PhD



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Teaching Activities

I have been teaching parts of the graduate course, Reproductive Physiology and Endocrinology (BMS 640), and a companion laboratory course, Research Techniques for Gametes and Embryos (BMS 642). However, my teaching will be minimal after I officially retire late in 2011, and my active involvement in research will decrease as well. I no longer take new graduate and postdoctoral students as major advisor.

Research Interests -- Reproductive Physiology

My main focus is on in vitro fertilization and culture of mammalian embryos, including the related areas of oocyte maturation, micromanipulation, and cryopreservation of embryos and oocytes. Most of this research is with cattle and horses. We are studying the pathways used by bovine embryos to metabolize gluose. We have found that oxidizing NADPH with phenazine ethosulfate decreases lipid droplets markedly in in vitro-produced bovine embryos. We have also found that fructose is superior to glucose for culturing bovine embryos in vitro.

Sperm capacitation treatments in horses and various in vitro fertilization media also are of interest. Zona-free and zona-intact bovine oocytes have been used as a model for studying capacitation of equine sperm. We have determined that capacitation of equine sperm occurs more readily when polyvinyl alcohol rather than serum albumin is the macromolecule in the fertilization medium.

Recent research includes how bovine oocytes regulate mRNA. We have found that it is possible to inject radiolabeled RNA constructs into oocytes and successfully recover modified versions of the same construct some hours later. Another project concerns the role of microRNAs in oocyte maturation.

We have been inseminating cattle artificially with unconventionally low numbers of sperm, including additives that enhance fertilization. These techniques were applied to produce the first calves using artificial insemination of sexed sperm. We also do considerable experimentation on practical methods of synchronizing ovulation of fertile bovine oocytes using cattle on a number of cooperating and University ranches.

Our research on cryopreservation of oocytes and embryos, both conventionally and via vitrification, is aimed at simplifying procedures without decreasing rates of survival. We also have developed systems for cryopreservation that have no components of animal origin, such as serum albumin, in order to decrease chances of spreading viral diseases.