Ian Wilmut (1944-) [1]

By: Maayan, Inbar Keywords: Biography [2] Nuclear transplantation [3] Genetic engineering [4]

British embryologist Sir Ian Wilmut [5], best known for his work in the field of animal genetic engineering and the successful cloning [6] of sheep [7], was born 7 July 1944 in Hampton Lucy, England. The family later moved to Scarborough, in the north of the country, to allow his father to accept a teaching position. There Wilmut met Gordon Whalley, head of the biology department at Scarborough High School for Boys, which Wilmut attended. Under Whalley's influence, young Wilmut first expressed interest in the life sciences and after graduating high school, he enrolled in the University of Nottingham to study agriculture. It was during his freshman year at Nottingham that Wilmut first came into contact with scientific research. He was mentored by Professor Eric Lamming, an expert in reproductive science and animal physiology, who sparked Wilmut's curiosity with animal genetics. Wilmut's father, Leonard Wilmut, had diabetes, which eventually brought about blindness and may have been another, more personal factor that stimulated Wilmut's interest in the field. The summer before his graduation from Nottingham, Wilmut completed an eight-week internship at Cambridge in the laboratory of Christopher Polge, a prominent cryobiologist. There, he was introduced to techniques of preserving and manipulating animal cells.

After graduating from Nottingham in 1967 with a degree in agricultural science, Wilmut entered Darwin College at Cambridge University [8]. While at Darwin, Wilmut continued to work in Polge's laboratory. There, he joined research on freezing and preserving boar semen [9], in which Polge had already made significant breakthroughs. During his time at Darwin College, he also worked with L. E. A. (Tim) Rowson. Wilmut was awarded his PhD in 1971 for his thesis on deep freeze preservation of boar semen [9]. After receiving his doctorate, he continued his research at the Animal Breeding Research Station (ABRS), located in Roslin, a short distance from Edinburgh, Scotland. (The ABRS would be renamed the Roslin Institute in 1993.) Wilmut's research focused on the cryopreservation [10] (freezing) of cow [11] embryos and their subsequent ability to develop into viable [12] cows. He and his team managed to implant a frozen calf embryo in the womb [13] of a surrogate [14] mother, yielding a calf, Frosty. As a student of agriculture, Wilmut was aware of the limitations of cattle reproduction; his technique, which allowed for the transfer of embryos and for stock improvement, had great prospects for the livestock and agricultural industry. Wilmut's research would then take him to the next step: cloning [6] an organism.

In the 1980s, the wider scientific community held significant doubts about the prospect of cloning [6] any animal, let alone a mammal [15]. When Wilmut heard that an embryologist in the US, Steen M. Willadsen of Grenada Genetics, had supposedly cloned cattle (the research was never published), he was emboldened in his research. Willadsen had published a number of papers in the 1970s and 1980s on his various techniques and discoveries, a number of them coauthored by Rowson and Polge, Wilmut's mentors from Cambridge. At the Roslin Institute, Wilmut worked with Keith Campbell. Together, they realized that in order to make an already differentiated cell behave like an embryonic cell, it would be necessary to cause the cell to become quiescent, or, in effect, to hibernate. They induced quiescence in differentiated embryonic cells and implanted them in the wombs of surrogate [14] sheep [7]. The result of this process was manifested in two sheep [7], Megan and Morag, born in July 1995.

The next breakthrough for Wilmut and his team came in July 1996 with the birth of Dolly. Named after country singer Dolly Parton, the cloned Finn Dorset sheep [7] was produced from the combination of an ovum [16] and an adult mammary cell's quiescent nucleus [17]. The mammary cells, harvested from the udder of an ewe, had been made to hibernate through starvation, which caused near-immobility in the differentiated nucleus [17]. The quiescent nuclei could then be injected into denucleated sheep [7] ova and implanted into a surrogate [14] mother. Here, the nucleus [17] would resume activity and the cell would behave like a regular embryonic cell. Dolly's birth and, more importantly, the methods by which she was created, drew much attention to Wilmut and his team, both in the scientific community and in popular culture. Many feared that the discoveries and advancements made at the Roslin Institute would lead to abuse of embryos and to the eventual cloning [6] of humans [18]. In several interviews following Dolly's unveiling, Wilmut made it clear that he was not in support of human cloning [6].

After Dolly, Wilmut continued to work diligently at the Roslin Institute, where he did further research on embryological manipulation until 2005. At that time, he became director of the Centre for Regenerative Medicine at the University of Edinburgh [19]. In addition, he received special permission to extract cells from cloned human embryos and to use them to study motor neuron [20] disease. However, he abandoned this particular method when he heard of one developed by Japanese scientists who, instead of using embryonic stem cells [21], were striving to induce greater potency in adult somatic cells. Wilmut had always emphasized the importance of ambitious research with cautious application as a vital rule in cutting-edge research such as his own, and continues to be a great supporter of the field of regenerative medicine [22].

Wilmut and his wife Vivien have three children and five grandchildren. He has received many honors, including the Order of the British Empire in 1999, induction [23] into the Royal Society in 2002, the Paul Ehrlich Prize in 2005, and the prestigious Shaw Prize in 2008. He was knighted in 2008, an event that also sparked great controversy, since many people felt that he had overstepped his bounds in the manipulation of life, or that he had taken too much credit to himself concerning the success of the

work in his lab. Despite the controversy, Wilmut continues to be an important mind and personality in the field of embryology [24].

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