DOLLY ON THE ROAD TO POLLY


This is a wise book. In addition to imparting the techniques of mammalian cloning and the biographies of the scientists who performed these feats, this inexpensive volume provides a worldly perspective on how contemporary biology is done. The book is woven together from three perspectives: that of Ian Wilmut, the principle investigator responsible for cloning Dolly; Keith Campbell, the cell biologist working with him, who provided the key idea that allowed them to succeed where other groups had failed; and Colin Tudge, an award-winning science writer who interviewed them and who provides a running commentary.

I assigned this book to my undergraduate students, and almost to a person, they wrote that they had been surprised by it. First, they were surprised by the down-to-earth descriptions of science and the scientists. There is a physicality in this book, especially in its descriptions of sheep tending and breeding in the dark Scottish winters. The smell of wet hay and lanolin seeps through the pages at times. Second, they were surprised that these sheep are depicted as crucial actors in this story, not mere bodies upon which scientists did their experiments. The third surprise was that the narrative is not one of heroic conquest. We do not receive a linear tale of how ignorance was removed and truth artfully uncovered. Rather, the tale is of contingent events: a scientist having to change his research focus to stay employed, a medical technician looking for a new job, a conversation in a Dublin pub where part of the puzzle falls into place. One of my favorite sentences from this book comes from Ian Wilmut: “The story may seem a bit messy, but that’s because life is messy, and science is a part of life” (p. 36).

The students enjoyed meeting the different sheep, from Frosty (the sheep whose embryo had been frozen before implantation) through Morag and Megan (the sheep clones made with the nuclei of embryos rather than the nuclei of adults), Dolly, and finally to Polly. They were also surprised to learn that Dolly was not the long-desired culmination of a research effort, but that she was merely the test case for the production of transgenic clones, led by Polly. The history of “pharming” is outlined, and the authors discuss the scientific and medical possibilities and the possible problems with this technology.

There is a subtle philosophy of biology in this book. The book is certainly no celebration of genetic reductionism. Indeed, it is the opposite. Wilmut and Campbell are quick to tell their audience that even cloned sheep have different “personalities,” and that the clones are not even as alike as identical twins.
Identical twins have the same mitochondria, but the sheep are merely "nuclear clones" (pp. 46, 60). Wilmut also reiterates his stand against both human cloning and human genetic engineering, pointing out that "most genes are pleiotropic, often having effects besides the one the engineer might intend" (p. 290). The students were surprised that the creators of Dolly had so much respect for the environment. "The genome," they claim, "merely sets the broad limits on the possibilities.... The effect of environment on personality and on educational achievement is clearly stupendous... genes lay down the ground rules, but in the end our upbringing and experience make us who we are" (pp. 278–279).

It is tempting to say that this book has the hallmarks associated with the Scottish Enlightenment: that experience is more important than endowment, that the acquisitive ethics of capitalism can be reconciled with sociability, sympathy, and justice; that history can be presented as a narrative focusing on different stages of development; that commerce is a principle part of a country’s growth; and that knowledge, above all else, should be useful.

Perhaps, because of this philosophy, there is a peculiar ease by which commerce comes into this book. Although Wilmut appears to subscribe to a view of science and technology that sees them as distinct (as they had been for centuries), he goes on to portray them as reciprocally interacting processes, each forming and informing the other (p. 9). Just as science becomes the foundation of new technologies (specifically, genetic engineering, cloning, and genomics), so these new technologies allow new discoveries to be made in biological science. The research leading to Dolly and Polly was, after all, done for the very practical aims of British agriculture and pharmaceuticals. So the story told here is not one of science contaminated or of science polluted (as in, for example, Rifkin’s books); rather it is a narrative where capitalism is normative for science. Having not grown up with that worldview, it came as more of a surprise to me than to my students when Wilmut and Campbell end their discussion of genetic engineering by saying, "Already PPL [a biotech company] is beginning to achieve success with gene targeting in sheep, although, at the time of writing, we cannot give details for commercial reasons" (p. 239). Nondisclosure even affects trade paperbacks!

This is a book that is designed to be read by intelligent laypeople and undergraduates. It does an excellent job of making complicated phenomena understandable. Indeed, one of the assumptions of this volume is that it can be understood: "Although the story is complicated, it is biology, not physics: that is to say, it is not weird" (p. 17). Biology does not ask one to imagine time passing at different rates in different places nor does it require mathematics to appreciate its conclusions or its beauty. And this book succeeds admirably in bringing relatively uninitiated readers to a point where they can understand the basic mechanisms of the cell cycle, the essential features of mammalian development, and the fundamental principles of modern genetics.

This ability to be understood is not merely a secondary characteristic of this book. It is an essential goal. According to Tudge, intelligent laypeople had better start understanding science. "Science and technology change our lives more directly and in the end more profoundly than any other social force. Governments do not so much direct technologies as adjust to them" (p. 303). And this is a good place for laypeople to become familiar with biology and how it is done. The people in this book are working scientists. They are neither heroes nor villains. While it would be easy to sensationalize certain experiments and demonize certain scientists, it just is not done here. There are no Frankensteins or Dr. Moreaus in this book. There is not even the evil bureaucrat. The protagonists are “ordinary blokes” making a living, enjoying their work, picking up the kids, and trying to be good neighbors. If noth-
ing else, this book is a good counterbalance to the aggressive and competitive view of science depicted in James Watson's books on his discoveries.

The Second Creation (despite its bombastic title) is a very much-welcomed addition to the growing literature on cloning and what biotechnology means. It is the book that I would recommend to interested friends, neighbors, and fellow scientists who want to know the bases of what all this cloning fuss is about.

SCOTT GILBERT
Department of Biology
Swarthmore College
Swarthmore, PA 19081