Alchemy of aging

Merchants of Immortality: Chasing the Dream of Human Life Extension

Stephen S Hall

Houghton Mifflin Company, 2003
439 pp. hardcover, \$25.00
ISBN 0-61809-524-1

Reviewed by Tom B L Kirkwood

For a work of engaging and painstaking science journalism, one would have to search far to find anything that beats Stephen S. Hall's *Merchants of Immortality*. This is the good news. The bad news is that behind its blow-by-blow account of intrigue and scientific skullduggery, the book is extraordinarily narrow in scope. It focuses by far most of its more than 400 pages on just two major strands of research that seek to combat the aging process: telomerase and stem cells. And even these are restrictively described. It offers only the slenderest acknowledgment of the broader societal context within which hopes of human life extension are being kindled by the 'merchants' of its title. The urgent challenge surely is to add quality to the increased life expectancy that has already been delivered by the great advances of the twentieth century.

Hall sets the stage by describing a visit to the home of Leonard Hayflick, one of the great pioneers in aging research whose perseverance against considerable odds gave the field its cell culture model of aging—the Hayflick Limit. Hayflick, as Hall describes him, is deeply skeptical about the prospects for significant extension of human life anytime soon. His is one of the few voices in the book urging caution, although later on Hall does briefly acknowledge that, in fact, Hayflick speaks for most leading researchers in the field.

In the opposite corner, we encounter the enigmatic Michael West, whose career has been dominated by one venture after another seeking to capitalize on research aimed at life extension. West's first significant role was as the founder of the Geron Corporation, a company that made its name initially for its work on telomerase and that has since developed major ambitions in stem cell science and regenerative medicine. Hall's gifts as a writer vividly bring to life West's extraordinary skills as a seller of dreams to venture capitalists. Based on an interview with one investor who was there, we learn how West gave an "absolutely stunning talk and within an hour and a half had been promised \$17 million."

The twists and turns of the discovery of telomerase, the cloning of the gene and the demonstration of its immortalizing power in cell culture systems are well told. Along the way, we learn of the squabbles, too. A sad axiom of modern biology, reflects Hall, is that the hotter the field, the ruder the behavior of its practitioners. Sad, perhaps, but as Hall very well knows, it makes for good copy.

Although Hall documents his sources exhaustively, in more than 50 pages of notes, his scientific range is limited. For example, he does not do as much as is needed to put the telomerase work into context. As the field has advanced, it has emerged that there is much more to controlling cell proliferation than telomerase and that there is much more to tissue aging than just the Hayflick Limit. Unquestionably, the work included in Hall's account is of great significance. But when and how it might lead to any real prospect of intervention to extend human lifespan is anybody's guess. Some of the most interesting research in the field of aging is being done on how molecular stresses, such as those imposed by free radicals, cause the progressive deterioration of our cells and tissues as we age. Intriguingly, but not mentioned in the book, there are important links between these stresses and how fast telomeres become whittled down with advancing age.

The stem cell saga, as told by Hall, highlights the struggles by the US research community, under a succession of presidents, to win official sanction for such work. Grippingly told are the events leading up to George W. Bush's 'compromise' of permitting federally funded research to continue only on the "more than 60" human stem cell lines that existed as of August 8, 2001. For readers outside the United States, there is some interest, to be sure, in seeing how such momentous decisions are made in the world's most powerful nation—but only some.

For a book that, at its core, is about human aging, the content is depressingly centered on the fantasy of life extension. Relatively little attempt is made to engage with the much more attainable goal of combating age-related diseases, where the prospects, which include many avenues of research not covered by Hall, are a good deal brighter. The truth is that no honest 'merchant of immortality' yet exists, for the simple reason that no one can offer an assured way to extend human lifespan even by one day, let alone forever. The best bet, at present, is probably the rather unexciting advice to "eat your greens." A telling vignette hints at why Hall has chosen this particular focus for his book. In its early pages, he describes a meeting with Cynthia Kenyon, whose work has contributed important insights into the genetics of aging in nematode worms. In all her previous years of doing elegant experiments, Kenyon told Hall, hardly anyone outside the scientific community paid any attention to what she had accomplished. But as soon as she began to work on aging, she was inundated by requests for interviews. "Night and day," she said, "night and day."

If the idea of the book interests you, I do recommend that you read it. The tale is well told. For myself, however, I put it down wondering whether immortality may not be a little wasted on those who want it most.

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