Editorial

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Of genes and stars

In his story "The Nine Billion Names of God" Arthur C. Clarke describes a Tibetan lama who approaches a computer engineering firm for help with a project that has kept his monastery busy for 300 years: compiling a list of all of the possible names of the Supreme Being. By some arcane computation of their own, the monks have determined that all such names can be written with an alphabet of 9 letters, that the legitimate permutations of those letters will total 9 billion, and that the task will take 15 thousand years to complete. But, with a Mark V Automatic Sequence Computer, a diesel generator (which the monks already use to power their prayer wheels) and the assistance of two engineers, the task could be completed in a mere 100 days.

Clarke published this story in 1953, the year that Watson and Crick modelled the double helix. It was oddly prescient of the Human Genome Project, that mad dash to sequence all 100 000 human permutations of the 4-letter alphabet of life — ATCG — by the year 2005 (that is, in 15, not 15 thousand, years). And now, ahead of schedule, with a computerized capacity to sequence 1000 letters of our genetic code per second, we pretty much have it: the spelling of our molecules, the 3 billion base pairs on which all physiologic processes, healthy or pathologic, are predicated.

With only 4 days left on the job, Clarke's engineers realize that the monks are convinced when their task is complete "[t]he human race will have finished what it was created to do," and God will "simply wind things up." Unbelieving, and fearing the monks' reaction when the apocalypse fails to arrive, the engineers steal away by night just as the computer makes its last calculation.

They look to the sky. "Overhead," the story ends, "without any fuss, the stars were going out."

The Human Genome Project has been couched in the rhetoric of "the book of life," "the code of codes," "the most wondrous map ever produced by humankind" — as if it promised some ultimate description of the piece of work that is man. Francis Collins, director of the Project, puts it this way: "What more powerful form of study of mankind could there be than to read our own instruction book?"[1] Philosophically, this is a little strange. Surely no one means to reduce the human being to an iteration of base pairs. But can we possibly construe the mapping of our genes as self-knowledge?

The White House has announced (prematurely) the Project's completion, but the heavens have no fewer, and no more, stars than before. We will gain impressive diagnostic ability, sophisticated treatments, new drugs and more capacity for eugenics than will make us happy. But cancer will, *pace* President Clinton, not recede into memory as long as the environmental hazards that evoke it prevail. The scourges of the developing world —poverty, malnutrition, infectious disease and civil war — will lie beyond the reach of high-tech, futurist genetics. In this country we will struggle with rationing, social equity, and the devolution of care to the community. For such matters the responsibility will lie not in our genes, but in ourselves. — *CMAJ*

Reference

1. Text of remarks [by President Clinton, Prime Minister Tony Blair, Dr. Francis Collins and Dr. Craig Venter] on the completion of the first survey of the entire human genome project, 26 June 2000. Washington: Office of the Press Secretary, The White House. Available: www.gov /WH/New/html/genome-20000626.html