

The human-genome project

Turning-point

Ten years after the reading of the human genome, humanity is about to confront its true nature

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THE oracle at Delphi had two maxims posted above the entrance to her chamber, for the edification of those who sought her prophecy: "Know thyself" and "Nothing in excess". Self-knowledge is often the hardest to learn and the least welcome, but the brutal truth is best. Humanity had better hope so, anyway, for the truth will soon out for the entire species.

June 26th marks the tenth anniversary of the reading of the human genome—the 3-billion-letter-long message that promises self-knowledge to humanity. Each letter is a pair of chemical bases that has accumulated over the 3.8 billion years that life has existed on Earth.

Viewed that way—the addition to the message of slightly less than a base-pair a year—the evolution of something as complex as a human being is not such an incredible journey. But it is still an amazing one. Some of it is lost, as the DNA palimpsest has been erased and re-written. Much is the scribbling of vandals who have broken in and scrawled, "We woz 'ere", in the barbarian tongue of viruses, not yet erased by nature's librarian, natural selection. And plenty of the rest, the bit that should make sense, can be read but is not yet understood.

But it will be. Humanity's foibles will be laid bare. The species's history, from its tentative beginning in north-east Africa to its current imperial dominion, has already been revealed, just through being able to read the genome. It is now possible, too, to compare *Homo sapiens* with his closest relative—not the living chimpanzee, with whom he parted company perhaps 5m years ago, but the extinct Neanderthal, a true human. That will do what philosophers have dreamed of, but none has yet accomplished: show just what it is that makes *Homo sapiens* unique. The genome will answer, too, the age-old question of original sin. By showing what is nature, it will reveal what is nurture—and thus just how flexible and perfectible the human animal really is.

Ecce Homo

That is not, of course, why the genome project started. The pragmatists who began it were motivated by medical considerations. Diseases would be understood better and new targets for drugs discovered.

This is happening—more slowly than many hoped, but inexorably (see [special report](#)). So, too, is the industrialisation of genomic knowledge as better crops and clever ways of using micro-organisms to make chemicals are developed. Indeed, synthetic life itself is within humanity's grasp, as Craig Venter's announcement on May 20th of a bacterium with a synthetic genome has shown.

All these are great advances—but in the end, perhaps, not as great as the threat and promise of self-knowledge. Which recalls the oracle's second admonition: nothing in excess.

Genomics may reveal that humans really are brothers and sisters under the skin. The species is young, so there has been little time for differences to evolve. Politically, that would be good news. It may turn out, however, that some differences both between and within groups are quite marked. If those differences are in sensitive traits like personality or intelligence, real trouble could ensue.

People must be prepared for this possibility, and ready to resist the excesses of racialism, nationalism and eugenics that some are bound to propose in response. That will not be easy. The liberal answer is to respect people as individuals, regardless of the genetic hand that they have been dealt. Genetic knowledge, however awkward, does not change that.

Leaders