BOOKS: GENETIC ENGINEERING

Toward a New Human Species?

R. E. Spier

What would it take to deliberately create a new human species? Over the last 2.2 million years several species of humans have come and gone. *Homo rudolphensis*, *H. habilis*, *H. erectus*, *H. ergaster*, *H. antecessor*, *H. heidlebergensis*, *H. neanderthalensis*, and *H. sapiens* have left their characteristic remains to outline but dimly a story of continuing human speciation. We are the latest in the genus, and we are unlikely to be the last.

Redesigning Humans
Our Inevitable Genetic Future
by Gregory Stock
Houghton Mifflin Company, Boston, 2002. 287 pp. $24. ISBN 0-618-06026-X.

Our Posthuman Future
Consequences of the Biotechnology Revolution
by Francis Fukuyama
Farrar, Straus and Giroux, New York, 2002. 270 pp. $25, C$39.95. ISBN 0-374-23643-7.

A new species is characterized by the inability of its members to engage (under normal conditions) in a productive sexual union with organisms that are outside the species. Darwin showed us how this works. We need genetic (inheritable) change coupled with natural selection to generate a new species. The ten or so species that preceded modern humans came and went at a rate of about 200,000 years per species. Ours began some 130,000 years ago, so we could be just about due for a change.

Francis Fukuyama and Gregory Stock sense this, and in their recent books, they respond quite differently. Both authors review recent developments in biotechnology that presage ways in which humans might be changed by the application of the new techniques. Higher intelligence, beauty, height, artistic skill, and creativity figure predominantly in a much-repeated wish list. In *Our Posthuman Future*, Fukuyama concentrates his attention on the social and political outcomes. He deals with the philosophical issues in some detail, setting them in their historical and cultural context. He does not get close to the posthuman period that his title enticingly suggests He would rather have humans stay largely as they are, with only minor changes to free them from requiring drugs or genetic engineering to escape their depresssions. On the other hand, Stock thinks that major changes to the genetic make-up of humans can and will occur. In *Redesigning Humans*, he suggests the way public pressure is likely to develop to achieve these outcomes.

Stock, the director of the Program on Medicine, Technology, and Society at the UCLA School of Medicine, approaches humans from two starting points: one is mechanical and the other biological. On the mechanical side, he is clearly convinced that cyborgs (bionic people made by inserting bits of silicon chippery into human brains and bodies) are not the way humans are going to extend and enhance their range of abilities. He argues instead that we are more likely to become "fyborgs" (functional cyborgs) by developing extracorporeal electromechanical devices to improve and widen the scope of existing sense and effector organs. As Stock puts it, we would not wish to become cyborgs but would prefer to be fyborgs. Except in cases where mechanical devices must be internal to function (for example, heart pacemakers and insulin pumps), the suffering caused by putting such devices into the body places them at a considerable disadvantage when compared with the readily updatable additions one may make to sensory probes or data-carrying machinery that can find a suitable housing in or on one's normal attire.

On the biological side, Stock recognizes the power and seductiveness of the previously unimaginable suite of tools that is associated with the new biotechnology. He focuses on three of them: genetic engineering of human gametes, cloning, and genetic diagnosis before implantation. He is also mindful of egg banking, improvements to in vitro fertilization techniques, and the information we have from the (almost) complete sequence of the human genome. With the ability to make microarrays that can characterize the nature and workings of a cell by the simultaneous analysis of the activity of tens of thousands of genes, it will be possible to observe the actions of the 30,000 to 50,000 human genes in one experiment. Stock refers to the collective spectrum of activities that segues from embryo diagnostics to germline enhancement as "Germinal Choice Technologies."

Stock is not an enthusiast of somatic engineering approaches to producing genetically engineered humans. These methods are more difficult than gametic engineering because a particular tissue type has to be selectively affected; with gametic genetic engineering, only one cell has to functionally take up the introduced DNA. To achieve reliable emplacement in gametes or embryo cells, manufactured artificial chromosomes that can carry many ordinary and control genes may be used. However, Stock does not fully consider the implications of the extra chromosome. Only half of the offspring would contain the new chromosome unless both parties to the mating were similarly engineered. In addition, chromosomes can react with other chromosomes. Stock points out that simians have 48 chromosomes to our 46 (two of our simian ancestral chromosomes having combined) and that matings between humans and simians do not yield viable embryos. What if bits of other human chromosomes that contain genes essential for survival joined with the newly inserted chromosome? Would not a condition emerge that is akin to the difference between the simian and human chromosomes, a difference that may have been involved in the speciation of humans? And if speciation did occur and a new species of human emerged that eventually became the only living hominid, would the situation differ from previous speciations in

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Not in our future? Stock holds that people will prefer fyborgs (with their external electromechanical devices) over cyborgs, such as those that blur the boundaries between humans and machines in Ridley Scott's 1982 film *Blade Runner*.

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principle or in practice? Regrettably, neither author tackles this issue.

Fukuyama, a political economist at Johns Hopkins University's School of Advanced International Studies, approaches the ethics of genetic engineering from a different standpoint than Stock. He focuses on three issues: the right of a human to be human; the dignity of a human, which would be lessened by deliberate genetic manipulation; and the preservation of human nature. In contrast to Fukuyama's reliance on rights, dignity, and human nature, Stock builds his case using a variant of utilitarianism (often called acceptability ethics) that identifies the greatest good as that which is accepted by most of the people.

Human rights constitute a key element in contemporary moral discourse. In his book, Fukuyama generally discusses them in terms of how the allocation of rights is reflected in modern politics. He believes that his position is helped by a long-winded denunciation of the naturalistic fallacy (the argument "that nature cannot provide a philosophically justifiable basis for rights, morality, or ethics"). Fukuyama virtually ignores the corresponding duties that necessarily pertain to the expression of rights. If we turn to the history of chartered rights, we find they began with the Magna Carta of 1215 (which represents a hard-fought deal between the king of England and his barons) and the Bill of Rights of 1689 (a contract imparting mutual benefit to the incoming royals, William and Mary, and the English parliament). The history indicates that humans do not have rights "as of right," rather they engage in a contract whereby they agree to behave in a particular way so that they may enjoy certain privileges.

Dignity, too, is not a fixed parameter. Although various declarations assert the essential equality of all humans, it is obvious that this can only represent a statement of how humans are to be treated before the law. Fukuyama and others also hold that humans differ qualitatively from the animals from which we evolved and that this qualitative difference is the font of human dignity. But animals, too, are qualitatively different from one another without assignations of dignity.

Human nature stems from the expression of the genes as affected by their environment. Our genetics somehow defines our emotions—the human feature that Fukuyama wants to preserve. He claims that changing the emotional characteristics of existing humans would lead to changes in human values, and he cites the values that he would not wish to alter as compassion, caring, love, and the sense of equality. He also argues that by engaging in genetic enhancements we sacrifice freedoms, promote competition, and accentuate hierarchy. Hence, there is a need for more regulation. In the United States, agencies such as the Food and Drug Administration must be set to curtail and prevent research work that might lead to successful and safe techniques being developed to engineer animals and subsequently humans.

Notwithstanding the proscriptive legislation relating to human cloning and gametic genetic engineering of humans that has recently appeared on statute books of many liberal democratic countries and international bodies, Stock holds that such legislation will eventually be voided. China and other countries that do not have much truck with such liberal attitudes, are likely to use these techniques as soon as they become practicable. Although the West had its fingers badly burned by the eugenic practices of the Nazis, Stock believes that market forces and public pressure by parents wishing to improve the quality and performance of their children will demand genetic enhancement. And he predicts that if such services are denied, people will seek them abroad, as happens presently for treatments that are outlawed in the home country.

It is right to be concerned with how we might apply the new biotechnological tools to enhance human lives. With these books, Stock and Fukuyama each seek to lead our societies in the ways we might respond. But we live in a variegated world, and readers can be assured that diverse countries and peoples will react differently to the challenges ahead. I would applaud this differentiated response as it provides clues from which we may be able to guess what it is we are about to become.

BOOKS: ANTHROPOLOGY

At the Dawn of Tyranny

Elizabeth Carter

Mesopotamia has long served as a model case for understanding the origins of cities and states. Fieldwork in southern Iraq by Robert McC. Adams, which began in 1957, led to mapping the ancient settlements on the plains created by the Tigris and Euphrates rivers. Adams's *The Evolution of Urban Society* (Aldine, Chicago, 1966) set the agenda for contemporary research into early urbanism in the region. *Uruk Mesopotamia & Its Neighbors*, edited by Mitchell Rothman, pays tribute to that pioneering work with 15 articles that build on Adams's data and his rich intellectual legacy.

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Nonspecialists will find Henry Wright's essay, "Cultural Action in the Uruk World," the most accessible chapter in the book. Wright places the early Mesopotamian world of the fourth millennium B.C. and its capital city, Uruk-Warka, in historical perspective. He reminds the reader that "at the dawn of tyranny, the critical dynamic is that between would-be rulers and those whom they sought to dominate."

Susan Pollock uses a reanalysis of data from Adams's archaeological survey to challenge earlier conclusions that shared material culture equals political coalition. At the time, the Mesopotamian heartland was by no means a unified entity. Pollock identifies a relatively stable region in the northern alluvial plains, which was characterized by competing polities of comparable extent and scale. In the south, a larger and less stable polity was centered at the site of Uruk-Warka.

Uruk Mesopotamia & Its Neighbors
Cross-Cultural Interactions in the Era of State Formation
Mitchell S. Rothman, Ed.
School of American Research Press, Santa Fe, NM, 2001. 578 pp. $60. ISBN 1-930618-02-6. Paper, $24.95. ISBN 1-930618-03-4. James Currey, Oxford, 2002. £45. ISBN 0-85255-461-3. Paper, £16.95. ISBN 0-85255-460-5.

All of the contributors comment on the spread of Uruk material culture and establishment of the new settlements to the north and east of southern Mesopotamia during the fourth millennium. Was it accidental that the dispersal of material culture and possibly settlers coincided with the birth of cities and the origin of the state in ancient Sumer? In Pollock's interpretation, Uruk settlements (sites that have yielded Uruk-style artifacts) outside the Mesopotamian heartland were settled by the displaced and disaffected from the repressive Uruk state in the south.

Gil Stein's analysis of the site of Hacinebi, some 1000 km north of Uruk on the Euphrates, suggests that "Mesopotamians lived there as an economically autonomous diaspora community." He attributes the symmetrical nature of political and economic relations between the immigrant and native communities to the inability of the Uruk folk to control the locals at such a great distance from the Uruk center. But Stein does not explain why the local people, with their already relatively complex society, let the foreigners settle amidst their town in the first place.

For Guillermo Algaze the answer is clear: both parties benefited, at least at the beginning of the process. Eventually, cross-fertilization spurred the growth of local societies so that they became competitors, not partners. The Mesopotamian elites were able to convert their surplus