edited by S. L. BYRAND

Evolutionary Wisdom or Genetic Roulette?

What if we could decide our children's traits before they are born—or even conceived? That question is more than the plot of the just-released movie *GATTACA*; it was the basis for a AAAS public forum that provided a unique opportunity to examine the implications of human germline interventions *before* the first clinical application occurs. Such an approach helps provide a rational alternative to the media frenzy prompted by the announcement that Dolly is a clone.

Gene therapy researchers, theologians, ethicists, and others met at AAAS's headquarters on 24 and 25 September to discuss the potential consequences of manipulating our genes, whether to eliminate a dreaded disease or enhance intelligence. Germline intervention would permanently alter a person's genome with traits that could be inherited by future generations. This could have far more profound effects on human nature than would cloning.

In a scientific overview, Theodore Friedmann, director of the Program in Human Gene Therapy at the University of California, San Diego, related that some germline research has been successful in animals. He said that it is only a matter of time until we can do human germline intervention. The problems that might arise, said Friedmann, "are fiction now, but they aren't going to remain fiction for very long." Estimates of the time frame varied, with the soonest being 10 to 20 years.

During his summation of the potential clinical applications of germline therapy, Malcolm Brenner referred to the remarkable way that identical twins can be different: "Those who believe their children are something that can be made to order are going to have a high level of disappointment."

Brenner, who has been appointed director of the Center for Cell and Gene Therapy at Baylor College of Medicine, reported, "We are more than the sum of our genes. Our genes are not a blueprint, they are a recipe."

Lee Silver, a Princeton professor who specializes in behavioral genetics, focused on the therapeutic potential of allowing parents to have a healthy child: "If we're trying to cure disease, it shouldn't matter what the molecule is, whether it is a protein or DNA." He added, "Genetic modification could have a dramatic effect on who we are," noting that "we're 99% identical to chimpanzees." Later, Silver explained that "if a small number of genetic changes—accumulated through evolution—can do something as dramatic as to turn a chimplike brain into a human brain, then future genetic engineers may indeed gain the power to modify the human mind even further in predetermined ways."

"We're talking serious stuff here," said Ronald Cole-Turner of the Pittsburgh Theological Seminary during a discussion on the ethical and theological implications. He echoed several panelists' concerns that such interventions could affect what it means to be human. "We are organic beings. The true self, the person, the soul is very much connected to the organism." He continued, "Some might say, 'Alter the genes and you haven't altered the soul, so don't worry.' That's not our theology."

The panelists discussed a range of issues, including how therapeutic techniques could be used for enhancement. One participant remarked that cosmetic surgery is considered ethical, so why not genetic manipulation? Other questions concerned the principle of distributive justice—who controls what is done, who benefits, and who gets left out? Some panelists suggested that germline interventions, if available to only the wealthy, could further separate the classes. Financial costs of research and implementation could have other detrimental effects. "Putting money into this effort may mean that it will be taken from other important health care initiatives," reported Pilar Ossorio, director of the Genetics Division of the Ethics Institute at the American Medical Association.

Among other topics addressed were discrimination issues, such as how would we regard those who are altered, or who are not? Whose views on health and disease would determine what interventions occur? One panelist reported that some deaf parents would prefer to have a deaf child. Abdulaziz Sachedina, director of the Middle East Studies Program at the University of Virginia, discussed the Muslim perspective, saying, "Suffering is not evil, it's a way of maturity."

The forum was sponsored by AAAS's Program of Dialogue Between Science and Religion as well as AAAS's Scientific Freedom, Responsibility and Law Program. Both programs are planning a joint 2-year study of the issues raised at the forum, which can recommend whether our society should undertake human germline interventions, and if so, how best to proceed with clinical applications.

MIDDLETON/LIITTSCHWAGER

Photographers as Witnesses

In an exhibit at AAAS, remarkable portraits embody the need to preserve the species that humans have threatened toward extinction. Taken by renowned photographers Susan Middleton and David Liittschwager, the black-and-white images use stark backgrounds to keep all attention on the plant or animal.

Harvard's Edward O. Wilson, known as the dean of biodiversity studies, wrote the introduction to the book that supplements the exhibit. He said of the photos, "They speak to the heart. In the end their kind of testimony may count as much toward conserving life as all the data and generalizations of science."

The public may view the exhibit at AAAS's headquarters in Washington, D.C., on weekdays from 9 a.m. to 5 p.m. It will run until 21 December.

Ph.D. Scholarships Awarded

Scientific panels convened by AAAS have selected four doctoral students for the Canon National Parks Science Scholars program. Each of the Ph.D. candidates will receive $25,000 per year for 3 years to conduct research to benefit U.S. national parks. The scholarship program is underwritten by Canon U.S.A., Inc.; collaborating partners include the National Park Service, the National Park Foundation, and AAAS.

A dinner at AAAS on 22 October honored the scholarship winners; among the speakers was Secretary of the Interior Bruce Babbitt. Said Haruo Murase, president and CEO of Canon U.S.A., "Our hopes ride on the intelligence and dedication of these four students, and those who come after them." Canon U.S.A. announced plans to double its funding: beginning in 1999, eight scholarships will be given annually. Canon U.S.A. has committed $2.5 million in scholarships over the next 5 years.

The 1997 winnners are as follows: Ilene Grossman-Bailey of Temple University, who will investigate the contributions of prehistoric peoples to the management of New Jersey coastal resources; Tom Meixner of the University of Arizona, whose research is on the sensitivity of alpine catchments to changes in climate and atmospheric deposition; Andrew Suarez of the University of California, San Diego, who will measure the impact of exotic species in natural systems; and Dave Smyth of Michigan State University, who plans to measure the impact of national parks on local and regional economies.

AAAS Members Elected as Fellows

In September the AAAS Council elected 270 members as Fellows of AAAS. These individuals will be recognized for their contributions to science at the Fellows Forum to be held on 14 February 1998 during the AAAS Meeting in Philadelphia. The new Fellows will receive a certificate and a blue-and-gold rosette pin as a symbol of their distinguished accomplishments. Presented by section affiliation, they are as follows:

Agriculture, Food, and Renewable Resources

C. Eugene Allen, Univ. of Minnesota • Byron L. Burson, USDA-ARS, Texas A&M Univ. • C. Lee Campbell, North Carolina State Univ. • Cleora J. D'Arcy, Univ. of Illinois, Urbana • Brian A. Federici, Univ. of California, Riverside • Keith J. Karnok, Univ. of Georgia • Donald D. Kasarda, USDA -ARS, Western Regional Research Ctr. • Jaacov Katan, Hebrew Univ. of Jerusalem • Thomas Jack Morris, Univ. of Nebraska, Lincoln • Archie R. Portis Jr., USDA-ARS, Univ. of Illinois, Urbana • D. William Rains, Univ. of California, Davis • Max F. Rothschild, Iowa State Univ. • Theron S. Rumsey, USDA-ARS-LPSI, Growth Biology Lab., Beltsville, MD • Donald L. Sparks, Univ. of Delaware • Jeffrey J. Volenec, Purdue Univ. • George R. Wiggans, USDA-ARS, Animal Improvement Programs Lab., Beltsville, MD

Anthropology

Virginia Abernethy, Vanderbilt Medical School • Cynthia Beall, Case Western Reserve Univ. • Michael Kearney, Univ. of California, Riverside • Bruce D. Smith, National Museum of Natural History • R. Brooke Thomas, Univ. of Massachusetts, Amherst

Astronomy

Torrence V. Johnson, Jet Propulsion Lab. • John C. Raymond, Ctr. for Astrophysics

Atmospheric and Hydrospheric Sciences

Roger Atkinson, Univ. of California, Riverside • Alan K. Betts, Pittsford, VT • Kristina B. Katsaros, Univ. of Washington • Jennifer A. Logan, Harvard Univ. • Syukuro Manabe, Geophysical Fluid Dynamics Lab./NOAA, Princeton Univ.

Biological Sciences

Christopher Jeffrey Bayne, Oregon State Univ. • C. William Birky Jr., Univ. of Arizona • Gary J. Blomquist, Univ. of Nevada • Walter F. Boron, Yale Univ. • Arthur S. Brooks, Univ. of Wisconsin, Milwaukee • Bob B. Buchanan, Univ. of California, Berkeley • Roy L. Caldwell, Univ. of California, Berkeley • Ring T. Carde, Univ. of California, Riverside • J. William Costerton, Montana State Univ. • Michael J. Donoghue, Harvard Univ. • Michael F. Dunn, Univ. of California, Riverside • Henry L. Ehrlich, Rensselaer Polytechnic Institute • Susan G. Ernst, Tufts Univ. • Daphne G. Fautin, Univ. of Kansas • Susan E. Feinman, Potomac, MD • Stanley Fields, Univ. of Washington • Joachim Frank, New York State Dept. of Health, Albany • Marc E. Freeman, Florida State Univ. • Wayne Marcus Getz, Univ. of California, Berkeley • Scott F. Gilbert, Swarthmore College • Susan Gottesman, National Cancer Institute • Meredith C. Gould, Univ. Autonoma de Baja California, Ensenada • Louis J. Guillette Jr., Univ. of Florida • James Hanken, Univ. of Colorado, Boulder • Lawrence E. Hightower, Univ. of Connecticut • Theodore L. Hullar, Univ. of California, Davis • Graham A. Jamieson, American Red Cross, Rockville, MD • Ned K. Johnson, Univ. of California, Berkeley • George W. Kling, Univ. of Michigan, Ann Arbor • Nancy Knowlton, Smithsonian Tropical Research Institute • Richard K. Koehn, Univ. of Utah • Allen I. Laskin, Laskin/Lawrence Associates, Somerset, NJ • Pamela A. Matson, Univ. of California, Berkeley • Steven Miller, Univ. of North Carolina National Undersea Research Ctr., Key Largo, FL • David F. Moffett, Washington State Univ. • David William Mount, Univ. of Arizona • Patrick J. Mulholland, Oak Ridge National Lab. • Juliana C. Mulroy, Denison Univ. • Peter M. Narins, Univ. of California, Los Angeles • John C. Ogden, Florida Institute of Oceanography, St. Petersburg • John Steven Olson, Rice Univ. • George Perry, Case Western Reserve Univ. • Malcolm Potts, Virginia Polytechnic Institute and State Univ. • Jeffrey R. Powell, Yale Univ. • Greg H. Rau, Univ. of California, Santa Cruz • Bruce H. Robison, Monterey Bay Aquarium Research Institute, Moss Landing, CA • Parke A. Rublee, Univ. of North Carolina, Greensboro • Frederick B. Rudolph, Rice Univ. • Gerald Schatten, Univ. of Wisconsin, Madison • Howard H. Seliger, Johns Hopkins Univ. • Patricia M. Shaffer, Univ. of San Diego • Michael J. Simmons, Univ. of Minnesota • Kenneth B. Storey, Carleton Univ., Ottawa • Alan Robert Templeton, Washington Univ. • Joseph J. Torres, Univ. of South Florida • Gunter P. Wagner, Yale Univ. • Peter C. Wainwright, Florida State Univ. • David M. Ward, Montana State Univ. • Marvin Wasserman, Queens College, Flushing, NY • Bruce S. Weir, North Carolina State Univ. • Michael A. Wells, Univ. of Arizona • John Haynes Werren, Univ. of Rochester • James R. Wild, Texas A&M Univ. • Judith H. Willis, Univ. of Georgia

Chemistry

Paul Bohn, Univ. of Illinois, Urbana • Steven G. Boxer, Stanford Univ. • Stephen L. Buchwald, Massachusetts Institute of Technology • Alison Butler, Univ. of California, Santa Barbara • James A. Cowan, Ohio State Univ. • David R. Crosley, SRI International, Menlo Park, CA • Timothy A. Cross, Florida State Univ. • John G. Dorsey, Florida State Univ. • Robert C. Fahey, Univ. of California, San Diego • Gideon Fraenkel, Ohio State Univ. • Harold L. Friedman, State Univ. of New York, Stony Brook • Eliezer Gileadi, Tel Aviv Univ. • Eric M. Gordon, Versicor, Inc., South San Francisco • Frederick Peter Guengerich, Vanderbilt Univ. • Boyd A. Hardesty, Univ. of Texas, Austin • Tapio A. Hase, Univ. of Helsinki • William L. Hase, Wayne State Univ. • Eric M. Jacobsen, Harvard Univ. • Joseph M. Jasinski, IBM Research Div., Yorktown Heights, NY • Roger A. Jones, Rutgers Univ. • Marsha I. Lester, Univ. of Pennsylvania • Ronald M. Levy, Rutgers Univ. • John C. Light, Univ. of Chicago • Linda J. Magid, Univ. of Tennessee • Grant Mauk, Univ. of British Columbia • James Andrew McCammon, Univ. of California, San Diego • Robert E. Mesmer, Oak Ridge National Lab. • Eckard Munck, Carnegie Mellon Univ. • Iwao Ojima, State Univ. of New York, Stony Brook • James H. Prestegard, Yale Univ. • Peter W. Rabideau, Louisiana State Univ. • Elsa Reichmanis, Bell Labs., Lucent Technologies, Murray Hill, NJ • Robert W. Shaw Jr., U.S. Army Research Office, Research Triangle Park, NC • Jay S. Siegel, Univ. of California, San Diego • Carlyle B. Storm, Gordon Research Conferences, W. Kingston, RI • Marion C. Thurnauer, Argonne National Lab. • Steven C. Zimmerman, Univ. of Illinois, Urbana

Dentistry

Lawrence A. Tabak, Univ. of Rochester

Education

Barry J. Fraser, Curtin Univ. of Technology, Perth, Australia • Alan J. Friedman, New York Hall of Science, Corona Park, NY • Richard Shavelson, Stanford Univ. • James H. Stith, Ohio State Univ.

Engineering

Stuart L. Cooper, Univ. of Delaware • E. James Davis, Univ. of Washington • George Emanuel, Univ. of Oklahoma • Woodie Claude Flowers, Massachusetts Institute of Technology • Norman L.

Fortenberry, National Science Foundation • Arnold G. Fredrickson, Univ. of Minnesota • Martin E. Glicksman, Rensselaer Polytechnic Institute • Alan R. Greenberg, Univ. of Colorado, Boulder • D. Lynn Johnson, Northwestern Univ. • Jerome S. Schultz, Univ. of Pittsburgh • Dharmendra K. Sharma, U.S. Dept. of Transportation, Washington, DC • Martin Sichel, Univ. of Michigan, Ann Arbor • Soroosh Sorooshian, Univ. of Arizona

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Statistics

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