

SCIENCE & TECHNOLOGY

Health, Education, and Welfare issued a report on in vitro fertilization, but the panel never dealt with the freezing of embryos. In 1982, then Rep. Albert Gore, Jr., (D.-Tenn.) headed a House subcommittee that held hearings on frozen embryo research but came to no conclusions. Consequently, note Grobstein and his fellow researchers at the University of California, no firm federal guidelines were ever set. In addition, "a de facto ban on federal support of in vitro fertilization research has existed since then."

To date, at least five healthy infants have been born in Australia and the Netherlands from embryos that were fertilized outside the mother's body, temporarily frozen, and then reimplanted in her womb. (No such births have been recorded in the United States.) Grobstein and colleagues argue that the time has come for the "United States . . . [to] launch a comprehensive deliberative process [regarding] in vitro fertilization" and set public policy.

What are the ethical dilemmas? Consider some examples. It may soon be possible to freeze embryos for up to 30 years without harming them. If so, a couple might want to have a child now and store an embryo for the future, or adoption, or genetic testing. What happens if the parents die? (This happened in 1983, when an American couple was killed in a plane crash, leaving two frozen embryos in an infertility center in Melbourne, Australia.) Does the embryo then "belong" to the government, the parents' estate, or the storage facility? And there are related questions: Should the embryo always be subject to the will of its biological mother? Should human embryos be frozen and stored at all?

Without definitive regulations on frozen embryo research, the authors argue, the U.S. court system will soon be burdened with moral and technical disputes that it is not equipped to resolve. To prevent legal conflicts, the authors recommend temporary guidelines: the freezing of human embryos should be limited to helping infertile couples have children; embryos should be returned to the womb of the donor (unless the donor authorizes implantation in someone else); and no embryo should be stored for more than five years.

Grobstein and company contend that these restrictions should encourage controlled research while assuaging public fears of uncontrolled medical experimentation.

Darwinism Evolves

"The Evolution of Darwinism" by G. Ledyard Stebbins and Francisco J. Ayala, in *Scientific American* (July 1985), 415 Madison Ave., New York, N.Y. 10017.

Charles Darwin's theory of biological evolution has entered a new phase in its own evolution.

"The meaning of evolution at a molecular level is beginning to come clear," write Stebbins and Ayala, geneticists at the University of California, Davis. "It is now possible, for example, to give incipient answers to the question: How do new genes arise?"

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Originally, Darwin (1809–82) explained evolution through natural selection, or “survival of the fittest.” Animals randomly mate and pass on heritable characteristics. Those well suited to their environment survive; others die off.

But during the 1930s, a revised “synthetic” theory of evolution slowly displaced the original doctrine. Biologists affirmed Darwin’s belief that current species share common ancestors but disagreed with the explanation he offered. They argued instead that mutations and the uneven distribution of genetic material in the population played a greater role in evolution than did simple natural selection.

The latest thinking, according to Stebbins and Ayala, is that new genes created through “errors” are largely responsible for evolutionary changes. In one kind of error called “tandem multiplication,” a gene is repeated in sequence during meiosis (the process that forms sperm and eggs). The error multiplies as the organism grows and becomes part of the next generation. “Genetic variation” within a species, a precondition to chromosomal aberrations, is now believed to play a larger role than was once thought. Here, subtle differences in the genetic composition of two similar animals can lead to offspring whose genes differ slightly from those of their parents.

Interpreters of these latest findings split mainly into two categories, Stebbins and Ayala note. “Neutral” theorists argue that chance plays a larger role in an organism’s survival and variation than does natural selection. On another front, “punctualists” (led by Harvard’s Stephen Jay Gould) contend that the natural selection hypothesis fails to explain the *sporadic* pace of evolution, as seen in new fossil evidence. Both groups reject the synthetic theory.

Stebbins and Ayala, however, disagree with neutralists and punctualists. They believe that the synthetic theory, and the basic tenets of Darwin, are still sound. “The new molecular biology, by showing that the evolutionary process at the level of DNA is far more complex than had been thought, casts doubt on some old [Darwinian] certainties,” they say. But it also explains “how genetic information accumulates over evolutionary history.”

RESOURCES & ENVIRONMENT

Are Pollution Controls Working?

“No One Knows for Sure if Pollution Control Programs Are Really Working” by Rochelle L. Stanfield, in *National Journal* (Mar. 23, 1985), 1730 M St. N.W., Washington, D.C. 20036.

Last year, the United States spent about \$45 billion to control air and water pollution. But because of difficulties in accurately measuring pollutants in the environment, observes Stanfield, a reporter for *National Journal*, even the U.S. Environmental Protection Agency (EPA)