sequently discredited. But, says Gottesman, "this study is a continuation of the efforts of Shields and Nielsen [Niels Juel-Nielsen, a psychiatrist at the University of Odense in Denmark] to challenge received wisdom about the roles of genes and environment." Everyone, observes Gottesman, "seems to have made up their minds one way or the other." With such a dearth of data of the kind that can only be obtained by studying persons with identical genes raised in different environments, people have been free to be as dogmatic as they please.

Bouchard had a devil of a time getting funding for his study. Various probes at the National Institutes of Health were discouraged on the grounds that the study was too multidisciplinary for any institute to embrace it. He finally got some money from the National Science Foundation.

Although the ultimate conclusions of the study may well be susceptible to sensationalizing, Gordon Allen of the National Institute of Mental Health, head of the International Twin Society, does not believe it will find any "new and unique answers." The sample will not be large enough for that, and besides, too few of the twin pairs were reared in environments so radically different as to bring genetically based behavioral similarities into stark relief.

The most solid and unequivocal evidence will be that supplied by the physiological findings. Although the similarities are the most titillating to most observers, it is the discordances that will be the most informative. For any difference between a pair of identical twins is "absolute proof that that is not completely controlled by heredity."

At this point, no one can make any generalizations beyond that made by James Shields, who died last year. Shields wrote that the evidence so far showed that "MZ [monozygotic] twins do not have to be brought up in the same subtly similar family environment for them to be alike." He concluded, "I doubt if MZAs will ever be numerous and representative enough to provide the main evidence about environment, or about genetics, but . . . they can give unique real-life illustrations of some of the many possible pathways from genes to human behavior—and so will always be of human and scientific interest."

—CONSTANCE HOLDEN

Marriage of Conservation and Development

By their new strategy, environmentalists seek to help the world's poor and abandon their "elitist western mould"

A "World Conservation Strategy" designed to make conservation and development mutally supporting instead of antagonistic was announced on 5 March in Washington and numerous other capitals around the world.

Clearing of a tropical rain forest may cause problems.

The strategy, set forth in a detailed statement prepared with the help of some 700 environmental scientists and other specialists, has resulted from an initiative taken 3 years ago by the International Union for the Conservation of Nature and Natural Resources with the cooperation of the United Nations Environmental Program, the World Wildlife Fund, the Food and Agricultural Organization, and Unesco. Altogether, some ten international organizations have endorsed the conservation strategy, which has three main objectives:

- To maintain essential ecological processes and "life-support systems," such as the regeneration and protection of soil, the recycling of nutrients, and the cleansing of waters.
- To preserve genetic diversity, on which depends "the functioning of many [ecological] processes" and the "breeding programs necessary for the protection and improvement of cultivated plants, domesticated animals and microorganisms, as well as much scientific and medical advance, technical innovation, and the security of many industries that use living resources."
- To ensure that use of fish and wildlife species and valuable ecosystems such as forests and grazing lands can be sustainable and thus available for the support of "millions of rural communities as well as major industries."

Secretary General Alejandro Orfila of the Organization of American States (OAS), in announcing the conservation strategy at a large ceremony held at the OAS headquarters in Washington, said that it is "motivated by the conviction that the integration of conservation and environmental consideration into the world development process is essential to the future expansion of a dynamic world society."

Orfila observed that the initial upsurge of interest in conservation came more than a decade ago but seemed to abate with such troubles of the 1970's as the escalation of world energy prices, "rampant global inflation interspersed with periodic recessions," and a general problem of protracted economic instability and insecurity. But it is evident, he said, "that had mankind paid equal attention to the parallel environmental and conservation challenges before it, the current world economic crisis might be less severe.

"Rational use of natural resources is of vital and equal importance to both the advanced and developing nations," Or-

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fila added. "Both are aware that international cooperation is not a luxury but an essential factor both in preserving the global balance of nature and in reducing the damage to the world's ecosystems."

Robert S. McNamara, president of the World Bank, issued a statement supporting the conservation strategy and saying that the bank is committed to the principle of "sustainable development" through prudent resource management and protection of vital ecological systems. "A climate of economic growth, in the developing and developed nations alike, is absolutely essential if human degradation is to be reduced and ultimately eliminated," McNamara said. "But economic growth on the careless pattern of the past century poses an undeniable threat to the environment and ultimately to the very ecological foundations of development itself."

What practical consequences can be expected from the conservation strategy? Erik P. Eckholm, formerly with the World Watch Institute in Washington and now on the State Department's policy planning staff, offers an assessment that may be as realistic as any. In an interview with *Science*, Eckholm indicated that, while it may be some time before the strategy produces much in the way of visible results, it is nevertheless important because it signifies that now, at last, the international conservation community is pressing its case in a way that emphasizes an effective response to the desperate human needs of the Third World.

"The conservation strategy originated with traditional, old-line conservation groups [such as the World Wildlife Fund] which came out of the elitist Western mould," Eckholm said. "This document," he said, "represents a spreading awareness among members of the conservation community that they must support efforts such as land reform and agricultural development [for the benefit of the rural poor of Third World nations]."

Eckholm said that, at the same time, the governments of developing countries have been becoming increasingly aware that development efforts often end in failure and frustration when ecological systems are ignored and the resource base is abused. The conservation strategy document mentions, for example, what can happen when watershed forests are devastated by logging or misguided land-clearing for agriculture. It says:

> Sedimentation as a result of careless use of watershed forests can cut drastically the economic life of reservoirs, hydroelectric facilities, and irrigation systems. The capacity of India's Nizamsagar reservoir has been more than halved . . . and there is now not enough water to irrigate the 1100 km² of sugarcane and rice for which it was intended—and hence not enough sugarcane to supply local sugar factories. . . .

The strategy document says that, if its objectives are to be achieved, "the behavior of entire societies toward the biosphere must be transformed. . . . A new ethic, embracing plants and animals as well as people, is required for human societies to live in harmony with the natural world on which they depend for survival and well being."

—LUTHER J. CARTER

National Engineering Academy Elects New Members

Courtland D. Perkins, president of the National Academy of Engineering, has announced the election of 82 new members and 8 foreign associates, which brings the NAE's total membership to 1024 and foreign associateship to 81.

Arthur P. Adamson, General Electric Company; Arsham Amirikian, Amirikian Engineering Company; Donald J. Atwood, General Motors Corporation; Philip Barkan, Stanford University; Seymour Baron, Burns and Roe, Inc.; John W. Batchelor, Pittsburgh, Pa.; Wallace B. Behnke, Commonwealth Edison Company; Erich Bloch, IBM Corporation; Vincent S. Boyer, Philadelphia Electric Company; H. Raymond Brannon, Jr., Exxon Production Research Company; Howard Brenner, University of Rochester; Frank A. Cleveland, II, Lockheed Corporation; Esther M. Conwell, Xerox Webster Research Center; William H. Corcoran, California Institute of Technology; Stanley Corrsin, Johns Hopkins University; Eugene E. Covert, Massachusetts Institute of Technology; Cullen M. Crain, Rand Corporation; Douglass D. Crombie, U.S. Department of Commerce; Jose B. Cruz, Jr., University of Illinois, Urbana; Robert G. Dean, University of Delaware; Raymond F. Decker, INCO LIMITED; Leslie C. Dirks, Central Intelligence Agency.

John E. Dolan, American Electric Power Service; Robert A. Duffy, Charles Stark Draper Laboratory, Inc.; Lincoln F. Elkins, Sohio Petroleum Company; Richard S. Frank, Peoria, Illinois; Edgar J. Garbarini, Bechtel Group of Companies; Jacob M. Geist, Air Products and Chemicals, Inc.; Nicholas J. Grant, Massachusetts Institute of Technology; Richard W. Hamming, Naval Postgraduate School; Fred L. Hartley, Union Oil Company of California; Martin C. Hemsworth, General Electric Company; John D. Hoffman, U.S. Department of Commerce; Edward E. Hood, Jr., General Electric Company; John K. Hulm, Westinghouse Electric Corporation; Karl U. Ingard, Massachusetts Institute of Technology; Sheldon E. Isakoff, E. I. du Pont de Nemours & Co., Inc.; Rear Admiral Donald G. Iselin, U.S. Navy; I. Birger Johnson, Schenectady, New York; John W. Kalb, The Ohio Brass Company; George H. Kimmons, Tennessee Valley Authority; Leonard Kleinrock, University of California, Los Angeles; Shiro Kobayashi, University of California, Berkeley.

Henry Kressel, RCA Laboratories; Wesley A. Kuhrt, United Technologies Corporation; Louis Landweber, University of Iowa; Martin Lang, Camp Dresser & McKee, Inc.; Robert A. Laudise, Bell Telephone Laboratories; Griff C. Lee, J. Ray McDermott & Company, Inc.; Tingye Li, Bell Telephone Laboratories; Charles J. McMahon, Jr., University of Pennsylvania; Harry W. Mergler, Case Western Reserve University; Carl L. Monismith, University of California, Berkeley; Allen Newell, Carnegie-Mellon University; Karl H. Norris, U.S. Department of Agriculture; Frederic C. E. Oder, Lockheed Missiles and Space Company, Inc.; James Y. Oldshue, Division General Signal; Karl S. Pister, University of California, Berkeley; Robert C. Reid, Massachusetts Institute of Technology; James R. Rice, Brown University; Herbert H. Richardson, Massachusetts Institute of Technology; Gordon Robeck, U.S. Environmental Protection Agency; Victor H. Rumsey, University of California, San Diego; Jacob W. Schaefer, Bell Telephone Laboratories.

Galen B. Schubauer, Washington, D.C.; Glenn A. Schurman, Chevron Petroleum (U.K.) Ltd.; Beno Sternlicht, Mechanical Technology Inc.; William F. Swiger, Stone & Webster Engineering Corporation; Ernest W. Thiele, Evanston, Illinois; Kenneth L. Thompson, Bell Telephone Laboratories; Monte C. Throdahl, Monsanto Company; Thomas A. Vanderslice, GTE; Gregory S. Vassell, American Electric Power Service Corporation; Hans J. P. von Ohain, Dayton, Ohio; John V. Wehausen, University of California, Berkeley; Major General Jasper A. Welch, U.S. Air Force; Albert R. C. Westwood, Martin Marietta Laboratories; Gerald L. Wilson, Massachusetts Institute of Technology; Holden W. Withington, Boeing Commercial Airplane Company; Bertram Wolfe, General Electric Company; Chia-Shun Yih, University of Michigan, Ann Arbor; Laurence R. Young, Massachusetts Institute of Technology.

Foreign Associates: Victor F. B. de Mello, consulting engineer, São Paulo, Brazil; Frank R. Farmer, United Kingdom Atomic Energy Authority, Lancashire, England; Sir Charles Frank, University of Bristol, Bristol, England; Thomas Kilburn, Manchester University, Lancashire, England; Lucien C. Malavard, University of Paris, Paris, France; Stanley G. Mason, McGill University, Montreal, Canada; John R. A. Pearson, Imperial College of Science and Technology, London, England; Roy E. Rowe, Cement and Concrete Association, Slough, England.