

behavioral sciences

The evolution of altruism

Altruism, as a behavioral trait, could not survive according to the classical mathematical theory of natural selection. Evolution would favor the recipients of altruistic behavior, not the altruists themselves. P. J. Darlington Jr. of the Museum of Comparative Zoology at Harvard University says evolutionists have failed to produce a satisfactory general model for the evolution of altruism because they have put mathematics before biology.

In the February PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES he proposes group selection as a possible model for the evolution of altruism. Among territorial birds, nonbreeders sometimes make positive contributions by feeding the young of others. Worker ants sometimes feed each other. The altruistic individuals will not be favored but groups containing these individuals will be selected for survival. "Group selection cannot be the primary process in evolution of altruism," says Darlington, "but it can oppose and counteract trends in individual selection."

How would this model work in a theory of human evolution? So far Darlington has avoided the question, but he is getting his ideas together for a book he is writing on evolution.

Genes and mental development

If infant mental development is genetically controlled, then the level of development at each stage of growth should be comparable for twins. If these growth processes alternate between phases of acceleration and drift, then the rate of gain between stages for both twins should be the same. Finally, if heredity is a significant factor, then the exact duplication of genes for identical twins should make them more concordant than fraternal twins.

To test this hypothesis, the mental development of 261 pairs of twins was rated periodically from 3 months to 24 months of age. Ronald S. Wilson of the University of Louisville found a substantial degree of concordance between fraternal twins and a significantly larger correlation between identical twins. These results lead him to infer in the Feb. 25 SCIENCE that infant mental development is primarily determined by the genetic blueprint, and that except in unusual cases, other factors (socioeconomic and maternal care variables) serve mainly a supportive function.

Brain chemical manipulation

The human body uses various mechanisms to maintain its temperature at a set point. Scientists at Purdue's Laboratory of Neuropsychology in Lafayette, Ind., are changing the chemical makeup of brain fluid to change the body temperature of lab animals. When specific areas of the hypothalamus are perfused with excess sodium ions the body temperature of cats and monkeys rises by as much as 10 degrees. An excess of calcium ions has the opposite effect.

Purdue psychologist Robert D. Myers predicts eventual regulation of human-body temperature and says there are possible benefits. A slight rise in temperature could fight infections. For patients about to undergo surgery, a lower body temperature would slow down body processes. This would reduce the chance of tissue damage from lack of oxygen. The patient's reduced pulse rate would make it easier to control bleeding.

space sciences

Solar wind turn-around

Scientists have theorized that magnetic storms, the auroras and disturbances in radio transmissions are caused by charged particles from the solar wind—electrons and protons that stream into space from the sun. But the earth's magnetic field forms a protective shield around the earth causing the solar wind to flow past, so how enough solar particles could get inside the barrier to cause the observed disturbances has not been clear.

Anand Prakash of the Massachusetts Institute of Technology may have an answer. He has discovered the occurrence of earthward-flowing solar wind protons in the far magnetosphere. As the solar wind flows past the earth, it elongates the earth's magnetic field on the night side into a long tail that trails off in the direction away from the sun. At some point (now known to be past the moon-distance) the fields merge into a neutral line. It is at this neutral line, says Prakash, that solar wind particles are entering the earth's magnetic cavity. There they double back, following magnetic lines of force to the earth's surface and particularly to the poles.

His evidence comes from Explorer 35—a moon satellite. As the moon passed through the earth's magnetic tail, the satellite detected protons flowing the "wrong way"—back toward the earth and the sun. The protons had energies of about 1,000 electron-volts, enough to cause magnetic storms and influence the northern lights and radio transmissions.

Venus-study scientists chosen

Two Mariner spacecraft have flown past Venus—one in 1962 and another in 1967. Another craft will fly by Venus in 1974. Last week NASA announced the selection of 13 scientists who will help engineers plan more advanced missions to Venus, such as atmospheric probes and orbiters between 1976 and 1980.

Those chosen were Jacques Blamont of France; John C. Gille, University Corporation for Atmospheric Research; Richard M. Goody, Harvard; Donald M. Hunten, Kitt Peak National Observatory; Arvydas J. Kliore, Jet Propulsion Laboratory; Andrew F. Nagy, University of Michigan; Gordon H. Pettengill and Irwin I. Shapiro of Massachusetts Institute of Technology; Christopher T. Russell, University of California at Los Angeles; Alvin Seiff, Ames Research Center; Nelson W. Spencer of Goddard Space Flight Center; Ulf Von Zahn of Germany and James A. Weinman of the University of Wisconsin.

Mini-tours to replace Grand Tour

Last year NASA proposed a plan called the Grand Tour consisting of two missions to Jupiter-Saturn-Pluto in 1977 and two missions to Jupiter-Uranus-Neptune in 1979. A sophisticated, long-life spacecraft called TOPS would have made the journey. According to Deputy Administrator George M. Low, the Grand Tour was dropped this year because "there wasn't enough unity among scientists regarding the value of it."

Now this month John E. Naugle, associate administrator of NASA, told Congress of current studies to partially replace the Grand Tour. One plan calls for a two-planet fly-by using an improved Mariner-class spacecraft. Two craft, launched in 1977, would fly by Jupiter and then on to Saturn, passing Saturn three and a half years after launch.