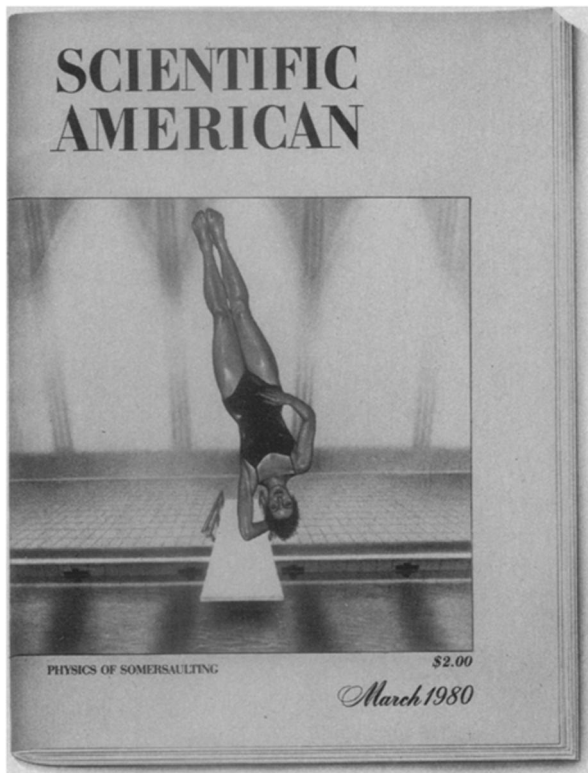


SCIENCE NEWS

MARCH 1, 1980
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SS433: A Star Among Stars



Do divers and gymnasts violate the law?

physics is the same for the astronauts in space who need to control their body orientation in a weightless environment.

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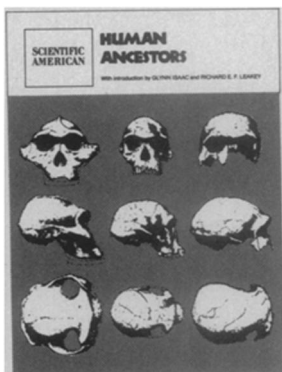
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We are accustomed to seeing divers and gymnasts begin to twist and somersault long after they have left the springboard or the floor. Indeed, in order to win gold medals divers need to perform such complex feats in midair as the forward two-and-a-half somersault with two twists. But, you may ask, doesn't this violate the law of conservation of angular momentum? It postulates: *In the absence of torques, or rotational forces, the angular momentum of a body is conserved.* In the March SCIENTIFIC AMERICAN you will see how this paradox is resolved. You may be relieved to learn that divers and gymnasts (and free-falling cats, too) perform their midair rotations without violating any laws of physics. Moreover, the underlying

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BEHAVIOR

The elderly and fear of teenagers

A pervasive fear of teenagers is keeping many elderly persons locked in their houses and away from activities they might participate in otherwise, according to a study by Geoffrey C. Godbey, professor of recreation and parks at Pennsylvania State University. In the study—conducted in Pittsburgh, Philadelphia, Boston, Baltimore, Newark and several other cities—Godbey reports that about one-fifth of those surveyed remained indoors after 3 p.m.—when school lets out.

About two-thirds of the 2,000 persons studied said the fear of crime, particularly at the hands of teenagers, keeps them away from senior citizen centers, parks and other places they would normally go. The fear of teenagers is so great, the study found, that 88 percent of those surveyed said they often cross the street or change direction to avoid young persons. In the 12 months before the survey, 9 percent of those studied had been crime victims, according to Godbey. The study was funded by the Andrus Foundation of the American Association of Retired Persons.

Teenagers curtail smoking

Teenagers, it appears, have cut back significantly in their smoking in the past five years. A University of Michigan study showed recently that marijuana use is declining among U.S. high school students (SN: 2/23/80, p. 121). And now, a National Institute of Education survey has found that the increase in teenage cigarette smoking reported between 1968 and 1974 seems to have come to a halt.

The study, conducted for NIE by Chilton Research Services, surveyed 2,639 boys and girls from 12 through 18 years of age. The results show significant drops in smoking—In 1979, 12.7 percent of the girls and 10.7 percent of the boys identified themselves as regular smokers, compared with the 1974 percentages of 15.3 percent for girls and 15.8 percent for boys.

According to the survey, smoking habits of parents and older siblings exert considerable influence on teenage smoking habits. If a parent and an older sister or brother smoke, the chances of a teenager smoking are nearly one in five; if neither a parent nor older sibling smoke, the chances are less than one in 20.

Other findings include:

- Adolescents who have friends who smoke are more likely to smoke than those who do not.
- Teenagers are aware of smoking's potential hazards to their health—those who have not already started to smoke do not intend to, and half of those who have started do not intend to continue.
- High school students taking college preparatory course are less likely than others to be smokers.
- Three-fourths of the teenagers who do not smoke—compared with one-third of those who do—concur that "cigarette smoking should be forbidden inside public places."

In a separate part of the survey, about half the youngsters studied in 1974 were followed up as young adults in 1979. That survey found:

- Adolescents—especially males—who reached age 17 or 18 without becoming smokers were not likely to begin smoking in the next five years.
- Former smokers who had quit by 1979 had not smoked as often or for as many years as current smokers.
- Adolescents tended to follow through on their 1974 promises; the single most reliable predictor of future smoking was the teenager's own statement about the likelihood that he or she would be smoking in five years.

The results of the studies are published in a report, *Teenage Smoking: Immediate and Long Term Patterns*, published by NIE.

SPACE SCIENCES

Saturn's rings: Sun-sputtered hydrogen

For years, many scientists have felt that the particles in Saturn's rings probably include substantial quantities of frozen water, one consequence of which could be a hydrogen "atmosphere" surrounding the rings, resulting from the breakup of the water molecules. A 1975 sounding rocket detected the Lyman-alpha emissions of hydrogen from Saturn's vicinity, and the ultraviolet photometer aboard the Pioneer 11 spacecraft last September yielded additional observations.

At least half a dozen different mechanisms for producing the hydrogen atmosphere have been proposed over the years, but none of them, according to Robert W. Carlson of Jet Propulsion Laboratory in Pasadena, seems capable of generating the amount of hydrogen that has been seen. Using the sounding-rocket data (the refined Pioneer results must await recalibration of the instrument, whose sensitivity was apparently changed by Saturn's radiation belts), Carlson reports in the Jan. 31 NATURE that sustaining the observed amount of hydrogen must require it to be produced—from whatever source—at a rate of about 3×10^{28} atoms per second. The possible mechanisms suggested heretofore, he says, are a thousand to a million times too inefficient.

The candidates have included sputtering of the ring ice by charged particles from the solar wind; by atoms of interstellar gas (which would also add themselves to the hydrogen count, though the total is still the lowest of the bunch); by meteorites (which would presumably knock off ice chips to be further decomposed by other processes); or by ions trapped on Saturn's magnetic field lines (a candidate that looked more reasonable before Pioneer 11 showed the surprising weakness of the field). Similarly, hydrogen could be formed by the combining, on the ring particles, of lower-energy electrons and protons that got there along the field lines from Saturn's ionosphere. Yet another suggestion has been the dissociation of water molecules that were first freed from the ice by sublimation in the near-vacuum of space. But none of these sources, Carlson says, can account for more than 9×10^{24} hydrogen atoms per second, and the weakest would produce perhaps 2.2×10^{22} .

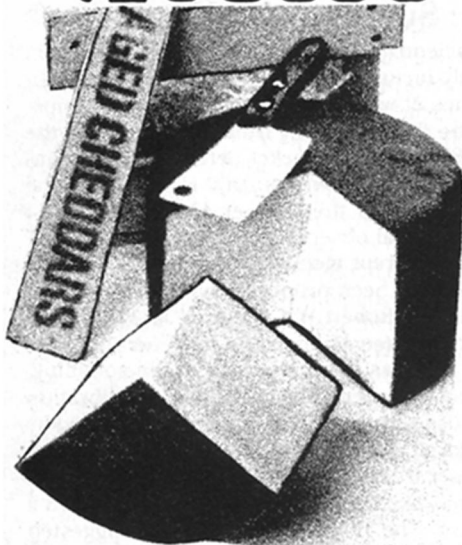
A far likelier candidate, he says, is ultraviolet radiation from the sun, which can dissociate water molecules on ice surfaces and emit hydrogen atoms and hydroxyl (OH) radicals. Even if only the single outermost monolayer of ice is affected, he calculates, hydrogen could be produced at a rate of 1.1×10^8 atoms per second from each square centimeter of icy surface. The projected area of Saturn's two main rings (A and B) at the time of the sounding-rocket observations, Carlson says, would represent a total production rate of 1.5×10^{28} atoms per second, close to that required to yield the sounding-rocket results. (More data will come from the Voyager 1 and 2 Saturn flybys this year and next.)

Delta rocket to cover for the shuttle

The Solar Maximum Mission spacecraft, launched Feb. 14 (SN: 2/23/80, p. 116), rode up on the 151st of NASA's workhorse Delta rockets, a Delta that, until as little as two years ago, was expected to be the last of its kind. Due to the numerous delays in the space shuttle program, however, NASA has announced that it will continue to offer its customers Delta launchings until the shuttle system is fully operational—which could be late 1982.

Launch customers opting to "go Delta" must make their choice nine months before their scheduled launch date or by the shuttle's first manned orbital flight, whichever comes first. NASA is also offering the services of a modified, stronger version of the rocket for customers whose payloads—designed with the shuttle's greater lifting capacity in mind—are too heavy for the standard Delta.

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BEFORE THE BEST INTERESTS OF THE CHILD—Joseph Goldstein, Anna Freud and Albert J. Solnit. Addresses what must happen in the life of an individual child before the state should be empowered to intervene in family life. Free Pr, 1979, 288 p., \$12.95, paper, \$3.95.

BEYOND THE BEST INTERESTS OF THE CHILD—Joseph Goldstein, Anna Freud and Albert J. Solnit. Originally published in 1973, this book advocates innovative guidelines aimed at preventing needless emotional scars in children caught up in the legal process, emphasizing the need to maintain or recreate a family for the child as quickly as possible. An epilogue added to this new edition tells the tragic outcome of one child placement case. Free Pr, new ed., 1979, 203 p., \$12.95, paper, \$3.95.

CAREERS WORKING WITH ANIMALS: An Introduction to Occupational Opportunities in Animal Welfare, Conservation, Environmental Protection and Allied Professions—Guy R. Hodge. Explores a variety of professions requiring diverse educational backgrounds and skills and analyzes the prospects for young professionals in these fields. The Humane Society of the U.S. (Acropolis), 1979, 146 p., illus., paper, \$6.95.

THE COLDER THE BETTER—David Wilson. The history, the present and future technology of the "science of cold" and the people who have made it happen. Atheneum, 1980, 272 p., \$9.95.

THE CONSTELLATIONS: How They Came to Be—Roy A. Gallant. Identifies the constellations in the sky and tells their stories as handed down to us from ancient Greece and Rome, and from the Sumerians, Babylonians, Chinese, Egyptians, Mayas, Polynesians, North American Indians and Australian aborigines. Four Winds Pr, 1979, 203 p., illus., \$11.95.

COPING WITH CHRONIC PAIN—Nelson H. Hendler and Judith Alsofrom Fenton. Introduces for the general reader the recent developments in the diagnostic procedures, psychological testing, counseling, non-narcotic drug treatment and medical facilities for chronic pain sufferers. Discusses the effects of pain on its victims and their families and provides advice to help deal with chronic pain. Potter (Crown), 1979, 166 p., illus., \$10.

DRAWING ON THE RIGHT SIDE OF THE BRAIN: A Course in Enhancing Creativity and Artistic Confidence—Betty Edwards. The author has designed a series of drawing exercises that attempt to develop a new way of seeing by tapping the special functions of the right hemisphere of the brain, thus helping you to learn to draw. Explanations of the functions of the brain hemispheres and the reasons behind each exercise make this a fascinating, as well as practical, book. J P Tarcher (St Martin), 1979, 207 p., illus., \$13.95, paper, \$8.95.

HORMONES AND REPRODUCTIVE BEHAVIOR: Readings from Scientific American—Preface by Rae Silver and Harvey H. Feder. Shows some of the ways in which environmental factors influence hormone secretions and behavior and the ways hormones are regulated within the body. Describes the action of hormones on cells of the body and evaluates the political, legal and ethical problems in research on reproduction. W H Freeman, 1979, 181 p., illus., \$15.50, paper, \$7.95.

AN INTRODUCTION TO SEED TECHNOLOGY—J. R. Thomson. The author assumes the reader has some knowledge of botany and genetics as he discusses taking basic seed from the plant breeder and multiplying it so as to ensure to the farmer year after year a supply of high quality seed. Wiley, 1979, 252 p., illus., \$44.95.

LIFE BEFORE BIRTH: The Story of the First Nine Months—Stephen Parker. Tells the story of the first nine months of a human life; nine months spent growing and developing from a tiny cell into a fully formed baby. Adapted from an exhibit at the British Museum (Natural History). Cambridge U Pr, 1979, 48 p., color and b&w illus. by John Bavosi, \$7.95, paper, \$3.50.

MESOZOIC MAMMALS: The First Two-Thirds of Mammalian History—Jason A. Lillegraven et al. Eds. Mammals have been an important part of the earth's land fauna for at least 200 million years. This book is a comprehensive review of what is known about mammalian life during the Mesozoic era—before the extinction of the great reptiles. U of Cal Pr, 1979, 311 p., illus., \$35, paper, \$9.75.

PALEOCEANOGRAPHY—Thomas J. M. Schopf. A first in this field, this text covers each of the major topics of paleoceanography: ocean volume, bathymetry, water studies, temperature, chemistry, climatology and biology. Harvard U Pr, 1980, 341 p., illus., \$25.

THE PETROLEUM DICTIONARY—David F. Tver and Richard W. Berry. A comprehensive dictionary-handbook that covers virtually all aspects of the petroleum industry for those involved in the industry, students and librarians. Van Nos Reinhold, 1980, 374 p., illus., \$22.50.

THE POLITICS OF CONTRACEPTION—Carl Djerassi. An exploration of the critical issues surrounding birth control, not only as it affects the individual but, more broadly, as it affects the world, by the scientist who led the team that synthesized the first oral contraceptive. Norton, 1979, 274 p., illus., \$10.95.

THE RIGHT BRAIN: A New Understanding of the Unconscious Mind and its Creative Powers—Thomas R. Blakeslee. Explains the functions of the hemispheres of our brain. Indicates that we have not been taught to use the right hemisphere and offers suggestions for utilizing the right brain. Includes an extensive bibliography. Anchor Pr/Doubleday, 1980, 275 p., illus., \$10.95.

SCIENTISTS & INVENTORS—Anthony Felman and Peter Ford. An account of human progress told through the lives and achievements of the outstanding men and women whose imagination and ingenuity brought us into the technological age of today. Covers the time from Empedocles, who died in 430 B.C., to Christian Barnard. Beautiful illustrations enhance the text. Facts on File, 1979, 336 p., color and b&w illus., \$17.50.

THE SEASHORE WORLD—David F. Costello. Explores our fascinating coastal environment of beaches, cliffs, salt marshes, estuaries and sand dunes. Examines all facets of life in this complex and diverse environment, from the sea gulls overhead to the microorganisms living in the sand. A bibliography is included for the layman who wishes to delve further into the world of the seashore. T Y Crowell, 1980, 213 p., illus., \$12.95.

SONG OF THE SKY—Guy Murchie. Published originally 25 years ago, this book tells of a transatlantic flight during which anecdotes, examples and analogies trace the history and development of aviation in three specific areas: aerial navigation, meteorology and the elements of flight. A new foreword brings the book up-to-date. Ziff-Davis Pub (McGraw), 1979, new ed., 438 p., illus., \$12.95.