

**LABORATORY DIRECTIONS IN GENERAL ZOOLOGY**—Mary J. Guthrie and John M. Anderson—*Wiley*, 233 p., illus., paper, \$3.50.

**THE LIFE OF MAMMALS**—J. Z. Young—*Oxford Univ. Press*, 820 p., illus., \$10. This text-book treats the subject conventionally, yet shows how new approaches can be incorporated.

**MARCH'S THESAURUS-DICTIONARY**—Francis Andrew March and Francis A. March, Jr., introduction by Clarence L. Barnhart. Norman Cousins, Ed., New Supplement by R. A. Goodwin—*Hanover House*, 1240 p., \$9.75, thumb indexed \$10.75. This new edition replaces March's which went out of print during World War II.

**NEURITIS, SENSORY NEURITIS, NEURALGIA: A Clinical Study With Review of the Literature**—Robert Wartenberg, foreword by Wilfred Harris—*Oxford Univ. Press*, 444 p., illus., \$8.50. A clinical work by a practicing neurologist.

**NUCLEAR MASSES AND THEIR DETERMINATION: Proceedings of the Conference Held in "Max-Planck-Institut für Chemie"**—H. Hintenberger, Ed.—*Pergamon*, 267 p., illus., \$14. This conference was held at Mainz in July 1956.

**OFFERINGS AND ENROLLMENTS IN SCIENCE AND MATHEMATICS IN PUBLIC HIGH SCHOOLS**—Kenneth E. Brown and Ellsworth S. Obourn, assisted by Marguerite Kluttz—*Govt. Printing Office*, U. S. Dept. of Health, Education and Welfare, Pamphlet No. 120, 44 p., illus., paper, 25¢.

**POLYURETHANES**—Bernard A. Dombrow—*Reinhold*, 176 p., illus., \$4.50. A semi-technical treatise of the properties and correct application of this family of plastics.

**THE PSYCHOLOGY OF PERSONAL ADJUSTMENT**—Roger W. Heyns—*Dryden*, 548 p., \$4.90. An attempt to apply the results of research in psychology, sociology and cultural anthropology to our problems of adjusting in a complex world.

**SATELLITES AND SPACEFLIGHT**—Eric Burgess—*Macmillan*, 159 p., illus., \$3.95. Shows how the earth satellite program grew out of developments in military rockets and how it can lead to interplanetary probe missiles.

**THE SPECTRUM OF ATOMIC HYDROGEN**—G. W. Series—*Oxford Univ. Press*, 88 p., illus., paper, \$2. Since hydrogen is the simplest kind of atom, the interpretation of its spectrum has been of the greatest interest to theorists.

**TREATISE ON MARINE ECOLOGY AND PALEO-ECOLOGY: Vol. 1, Ecology**—Joel W. Hedgpeth, Ed.—*Geological Soc. of Am. Memoir* 67, 1296 p., illus., maps, \$12.50.

**THE TREE OF MATHEMATICS**—Glenn James, Ed.—*Digest Press*, 403 p., illus., \$5.50. Reference book for anyone working in mathematics or related fields. Contributions by well-known mathematicians.

**THE WAY OF THE WEATHER**—Jerome Spar—*Creative Educ.* in cooperation with the Am. Mus. of Natural Hist., 224 p., illus., \$4.95. Large format, many photographs and charts in color with clear text.

**THE WONDER OF WATER**—*Soil Conservation Society of America*, 15 p., illus., paper, 20¢. The story of water conservation in comic-book style.

**THE WORLD BENEATH THE WAVES**—Gilbert Doukan, translated by A. and R. M. Case—*De Graff*, 356 p., illus., \$6. Reports on the state of the world beneath the surface of the water which covers four-fifths of the world's surface.

**THE WORLD IN SPACE: The Story of the International Geophysical Year**—Alexander Marshack—*Nelson*, 176 p., illus., \$4.95. A popularly written history of geophysics with reference to the tasks of the IGY.

**THE WORLD OF THE INCA**—Bertrand Flornoy, translated by Winifred Bradford—*Doubleday*, 231 p., illus., paper, 95¢. Goes deep into the origins of Inca civilization.

Science News Letter, February 15, 1958

## GEOPHYSICS

# Satellite Recovery Seen

➤ **RECOVERING** artificial satellites with their valuable records of conditions at the fringes of earth's atmosphere was foreseen as one result of studies in the new science of "magneto-aerodynamics."

Dr. William R. Sears, director of the graduate school of engineering at Cornell University, told a National Academy of Sciences meeting in Washington how research in this science may provide means for the safe return of Explorer and other space vehicles. Further research in this field may also lead to a tremendous increase in the thrust of conventional rocket motors.

Studies in magneto-aerodynamics deal with the partial ionization of air that occurs when objects pass through it at extremely high speeds, particularly the re-entry of rockets and satellites into the earth's atmosphere. As friction and compression heat the air ahead of the object to very high temperatures, the atoms composing air release free electrons, thus making the air electrically conducting.

Research at Cornell, Dr. Sears reported, shows this conductivity can be further increased by "seeding" the air near a high-speed body with small amounts of substances that ionize easily, such as sodium or potassium. At speeds 10 to 12 times that of sound, which is about 1,000 feet per second at sea level, air conductivity several times

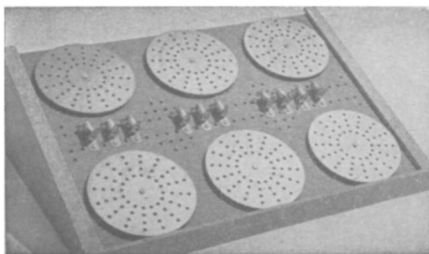
better than salt water can be thus obtained, Richard J. Rosa has calculated.

"If this technique can be worked out, and if magnetic field strengths comparable to those of permanent magnets can be provided in flight," Dr. Sears said, "electric currents will be set up by the motion of the air, and significant forces can be applied directly to the airstream."

For a satellite re-entering the earth's atmosphere at high speed, the electromagnetic relationships will resemble those of an electric generator. The hot, seeded air, being electrically conductive, takes the place of windings of the generator armature, while the magnetic field emanating from the satellite will supplant the generator's fixed field. As the satellite plunges into the atmosphere the moving of this hot-air "armature" across the satellite's magnetic field will generate an electric current, thus slowing down air flowing past it.

Concerning the possibilities of increasing a rocket's thrust, Dr. Sears said, "this will require the use of electric fields as well as magnetic, for now the analogy is not with a generator but an electric motor." He said the combination of a current and a magnetic field would give rise to a force that can be directed to accelerate the airflow rearward from the rocket.

Science News Letter, February 15, 1958



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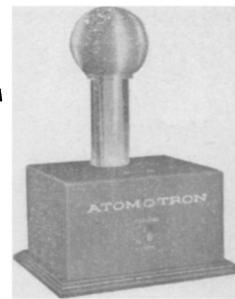
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