News of Science

Vanguard I

Vanguard I, the second U.S. satellite, was launched at Cape Canaveral, Fla., on 17 March by the Naval Research Laboratory's Project Vanguard, the Government agency assigned in July 1955 to the U.S. satellite program for the International Geophysical Year. The 3½ pound sphere, which is 6 inches in diameter, is traveling at approximately 18,000 miles an hour in an elliptical orbit that has an apogee of 2513 miles above the earth and a perigee of 407 miles. The figures exceed those for the three previous earth satellites (the two Soviet sputniks and the Army's Explorer I) chiefly because of the small size of the vehicle, which is purely a test sphere and which contains a minimum of instrumentation—two radio transmitters. Vanguard I is not officially an IGY scientific satellite, although Joseph Kaplan, chairman of the U.S. National Committee for the IGY, announced that its launching had been reported to IGY headquarters in Brussels.

Rocket assembly. The purpose of the firing was to test the 72-foot, three-stage Vanguard rocket, which represents a significant technical advance in rocketry. Prime contractor for the Vanguard assembly is the Glen L. Martin Company of Baltimore, Md. The first stage is said to be the first liquid-propelled rocket to have been designed without stabilizing fins or vanes. Most of the new missiles now follow this design. The saving in weight, and therefore in power needed to propel the vehicle into space, is considerable. Great economies of weight have also been made possible by using extremely thin airframes for all three stages. The first-stage engine, as a consequence, requires a thrust of only 27,000 pounds, compared with the more than 80,000 pounds for the modified Redstone used for the first stage of the Army's Jupiter-C, which launched Explorer I. Kurt R. Stehling, head of the Vanguard propulsion group, has said that the combustion efficiency of the three new rocket motors is "near the limit of the theoretically possible."

The first stage, which is 44 feet long and 45 inches across at its widest part, is a descendant of the Viking research rocket. It is manufactured by the General Electric Company. It uses kerosene for its basic fuel and liquid oxygen for oxidizing. The second stage, 31 feet long and 32 inches in diameter, is a descendant of the Aerobee research rocket and is manufactured by the Aerojet-General Corporation of Azusa, Calif. Its 7500 pounds of thrust are produced by a high-energy fuel called unsymmetrical dimethyl hydrazine and an oxidizer of white fuming nitric acid.

After the second stage burns out, it disgorges the third stage and the satellite sphere from its insides. The third stage, which is a solid-propellant rocket manufactured by the Grand Central Rocket Company, accelerates from a speed of 8500 miles per hour to one of 18,000 miles an hour. It develops 2300 pounds of thrust. When the orbiting speed is reached, a spring mechanism separates the burned out third-stage shell from the satellite.

Visual tracking. The shell—a cylinder-like object some 4 feet long and about 22 inches in diameter that weighs approximately 50 pounds—is orbiting behind the 6-inch satellite. The satellite, which circles the earth every 135 minutes, is probably too small for tracking without the aid of a telescope; however, the third stage casing may perhaps be seen with the naked eye at dawn or dusk.

Radio transmitters. The only unusual aspect of the satellite itself is the radio transmission system. One of the two transmitters carried is run by conventional mercury batteries and is designed to put out a continuous 10-milliwatt signal on a frequency of 108 megacycles for about two weeks. However, the second transmitter is operated by a group of six solar batteries distributed over the surface of the satellite in such a way that one or more always will be turned toward the sun when the sphere is on the sunny side of the earth. The satellite's path is so far from the earth that it will be in shadow for less than half of its orbit.

The solar-powered transmitter sends out a signal of 5 milliwatts on a frequency of 108.03 megacycles and is expected to operate for a long time, probably years, until cosmic dust or micrometeorites cause erosion. The solar batteries are the work of Hans K. Ziegler of the Army Signal Engineering Laboratory at Fort Monmouth, N.J., who is one of the German scientists brought to this country after World War II. He developed his battery from a solar battery produced by Bell Telephone Laboratories in 1954 that is now used to boost power on rural telephone lines.

Vanguard launching schedule. John P. Hagen, director of Project Vanguard, has announced that with the success of Vanguard I, the project has cancelled plans for firing another small test vehicle. The next satellite to be sent aloft will be a fully instrumented 21½-pound sphere. With this change in plan, Project Vanguard will attempt the launching of seven research satellites instead of the previously scheduled six.

Columbia Speeds Chemistry Ph.D.

Columbia University announced recently that it is making radical changes in the Ph.D. requirements in chemistry so that a candidate may complete postgraduate work in two years instead of the usual four or more. An accelerated program will begin in September for about 25 freshmen who have demonstrated exceptional ability in chemistry and related sciences in high school and in tests of the College Entrance Examination Board. The group will be admitted with advanced standing in chemistry and will take 144 points of credit instead of the 126 routinely required for graduation. The new program will enable the special students to begin research for the doctorate in the senior year and to eliminate lecture courses in graduate school. Thus they will achieve the Ph.D. after 4 years of college study and 2 years of graduate work.

Recommendations for U.S. Meteorology

The Committee on Meteorology of the National Academy of Sciences–National Research Council, under the chairmanship of Lloyd V. Berkner, president of Associated Universities, Inc., has released a 35-page interim report, *Research and Education in Meteorology,* which contains recommendations concerning the future of U.S. meteorological research. The most important of these recommendations is a proposal for the creation of a National Institute of Atmospheric Research.

Representatives of a dozen of the universities that are most active in meteorology have supported the Committee on Meteorology with the following resolution, which was directed to Detlev W. Bronk, president of the NAS-NRC:

RESOLVED: It is the sense of the assembled representatives of universities and kindred institutions engaged in meteorological, oceanographic, and related research and teaching, that the interim report of the Committee on Meteorology of the National Academy of Sciences be endorsed; that present support for basic research in meteorology at academic and related institutions should be substantially increased; and that a national institute for atmospheric research, operated by an association of universities, should be established to bring together scientists from meteorology and the related physical sciences and to provide research facilities on a scale required to cope with the global nature of the meteorological problem. It is further requested that appropriate organizational steps for establishing such an institute be taken immediately by the National Academy of Sciences, acting in concert with the universities and kindred institutions.

The resolution was signed by: W. A. Baum, Florida State University; R. A. Bryson, University of Wisconsin; H. R. Byers, University of Chicago; P. E. Church, University of Washington; B. Haurwitz, New York University; S. C. Hollister, Cornell University; H. G. Houghton, Massachusetts Institute of Technology; M. Neiburger, University of California, Los Angeles; H. H. Neuberger, Pennsylvania State University; S. Petterssen, American Meteorological Society; R. Revelle, Scripps Institution of Oceanography; and A. R. Kassander, University of Arizona.

Krypton-85 and Diagnosis of Heart Disease

Research at the Public Health Service's National Institutes of Health has shown that krypton-85, a radioactive form of a harmless inert gas, can be used to detect abnormal openings in the wall of muscle dividing the right and left chambers of the heart. Left to right "shunts" of blood which result from defects in the partitions of the heart are the commonest form of congenital heart disease. Accurate knowledge of the presence and location of these defects is essential for corrective surgery.

The new diagnostic technique was developed by research surgeon Richard Sanders, a staff member of the Clinic of Surgery of the National Heart Institute. The discovery was announced in the January issue of the *Proceedings of the Society for Experimental Biology and Medicine.*

Soviet Bloc IGY Plans

A weekly report of Soviet bloc activities in connection with the International Geophysical Year is being published by the U.S. Office of Technical Services. The reports contain information selected and translated from foreign-language publications regarding Soviet bloc plans and endeavors in rockets and artificial earth satellites, upper atmosphere, meteorology, oceanography, latitude, seismology, glaciology, the Antarctic, and other subjects. Non-Government scientists may subscribe to the series for $10. The series runs from 14 February 1958 to 2 January 1959. (Order PB 131632 *Soviet Bloc International Geophysical Year Information* from OTS, U.S. Department of Commerce, Washington 25, D.C. Back issues to 14 February will be supplied to subscribers regardless of the date of their order.)

Faculty Salaries

The average salary for college faculty members in the United States this year is $6120, according to the U.S. Office of Education.

A new study of higher education shows that average faculty salaries in public colleges and universities range from $5110 for instructors to $8530 for full professors; in private institutions, the average is $4230 for instructors and $7360 for full professors. The study is designed to provide basic information to assist college administrators in their planning. The 102-page report, entitled *Higher Education Planning and Management Date, 1957–58,* was prepared by W. Robert Bokelman, specialist in college business management, U.S. Office of Education.

Nearly 1150 colleges and universities, having more than 80 percent of all higher education enrollment, participated in the survey.

Salaries of full professors in the highest-paying single private university average $13,800, compared with an average of $5150 in the lowest-paying private university. The highest-paying public university had a salary average for full professors of $12,350, the lowest-paying $5750. The average salary of instructors in the highest-paying private university is $5150, compared with $3550 in the lowest-paying. The average for the highest-paying public university is $6550, compared with $3450 in the lowest-paying.

Among the lowest fourth of public universities, salaries average $7440 for full professors, $6280 for associate professors, $5460 for assistant professors, and $4410 for instructors.

The report shows that students in private colleges pay, on the average, nearly 3½ times as much in tuition and fees as most students in public colleges. Tuition and fees for resident students in public institutions average $155 for the current school year, compared with $531 in private institutions. Tuition and fees in public institutions average $13 more this year than last year, an increase of 9.2 percent. Such costs in private institutions went up $36, or 7.3 percent. In addition to salaries, and tuition and fees, the report covers other faculty benefits and room and board costs.

Copies of the publication (Circular No. 517) may be obtained for 60 cents each from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Atherosclerosis Findings

A reseach finding that seems to advance knowledge of coronary heart disease and other diseases associated with atherosclerosis has been reported by the laboratories of the departments of preventive medicine and pathology of the Harvard Medical School and the department of pathology of Children's Hospital, Boston. Atherosclerosis is now responsible for more deaths in the United States than any other one disease. The new approach developed at Harvard utilizes tissue-culture methods which make possible direct observation at the point where fatty substances enter cells grown from human arteries. Prior to this, the disease could be studied in the laboratory only by indirect methods, either in animals or by measuring the level of fatty substances in human blood.

Led by David D. Rutstein, head of the university's department of preventive medicine, the group of investigators say that they have observed the deposit of these fatty substances in arterial cells. More important, they maintain that they have also demonstrated that the process is reversible and can either be prevented with unsaturated fatty acids or aggravated with saturated fatty acids.

The new research results are published in the current issue of the British medical journal *Lancet.* Rutstein's associates are Estelle Fasolino Ingenito, research associate in preventive medicine; John M. Craig, assistant professor of pathology; and Marcello Martinelli, Lederle research fellow in preventive medicine from the University of Bologna, Italy.

Nomenclature of Cell Strains

At the International Tissue Culture Meeting, held in Glasgow, Scotland, last summer, the subject of the nomenclature of cell-strains used in tissue culture was considered and a study committee was appointed that made various recommendations. It was suggested that the following information be given when first