

ROCKETS AND MISSILES

Rosy U.S. Space Picture

► SCIENTISTS from the National Aeronautics and Space Administration presented a glowing picture of this nation's future achievements and profits in space before the Senate Committee on Aeronautics and Space Sciences. But the sad fact is that the United States cannot match present Soviet space capability until 1964.

U.S. excursions to Venus and Mars are not scheduled before that time, Dr. Abe Silverstein, director of NASA's office of space flight programs, told the Committee. But in the very near future an active repeater satellite program will both improve communications and cut down costs.

These satellites will be stabilized at a distance of 2,000 miles from earth so that they will orbit every 24 hours at the same rate as the earth.

Such satellites will be equipped to amplify messages sent from earth and relay the amplification back to earth at frequencies which can avoid blackouts that now occur

in all radio communications during periods of unusual solar activity.

Better weather information also will be available in the near future because of this nation's success with meteorological satellites, Dr. Silverstein said.

However, apart from practical applications, the ultimate scientific aim of all space exploration is directed at probing the secrets of the universe. Aimed at this goal are NASA's plans for orbiting solar, geophysical and astronomical laboratories. The solar launch is scheduled for this year and will carry a satellite of 380 pounds out into space with instrumentation designed to report back to earth on earth-solar relationships.

One of the aims of the civilian space program is to help other nations participate in upper atmosphere research. Those countries getting space aid from NASA include Italy, Canada, Great Britain, France, Japan, Norway, Sweden and Argentina.

• Science News Letter, 79:165 March 18, 1961

GENERAL SCIENCE

Young Humanitarians

► THE BEST of the coming generation of scientists are humanitarians as well as scientists, actively concerned with the deprivations of hunger, pain, ignorance and poverty among the peoples of the world.

Asked what single scientific discovery they considered most important, the 40 winners of the 20th Science Talent Search, all of them high school seniors, emphasized the development of new sources of cheap and abundant power and food supplies, cures for disease, unification and communication between scientific disciplines and people, and breakthroughs in understanding the most basic laws of biology, mathematics and the physical sciences.

Sources suggested for abundant power at very low cost included more efficiently controlled hydrogen fusion, solar electricity, deuterium from the oceans via controlled fusion, and atomic batteries.

Cancer, arthritis, birth defects and degenerative diseases of old age head the list of medical problems mentioned as being most important.

Comments made by these young persons included:

"The new science discovery most needed by the world today is a method of simplifying and reducing the cost of synthesizing our drugs. Some discovery is needed which will permit laboratories in other countries not as well equipped or endowed as America's to produce large quantities of the drugs needed to cure the ailments of their populations."

"The improvement of mankind's use of the tremendous progress of the last 50 years would mean extensive further development in the social sciences."

"Three essential discoveries are a process

for the production of foods at high efficiency from ocean plants; a contraceptive device, acceptable to all major creeds, for stemming the population explosion, and a system of communication cheap enough and powerful enough to make possible world-wide

speech between members of competing countries in large numbers."

These highly talented young scientists are not only aware of such problems, but are also preparing themselves to contribute to productive solutions.

Answering a question concerning their personal goals for the future, they mentioned plans to "be instrumental in the re-uniting of the arts and sciences, because of the widespread and deleterious effects of their present lack of communication"; to "make some contribution toward a successful integration of electronics and computers on one hand and medicine on the other"; and to "make an advancement in preventive medicine, correlating genetic inheritance of certain physical or chemical characteristics with the genetic inheritance of susceptibility to specific diseases."

They find basic questions very challenging in such fields as magnetism, gravity, electric charges, matter and energy; the integration of biological and physical sciences; the interactions of behavior, physiology and evolution; and cell structure. They are eager to join the search for answers.

A strong feeling of personal obligation to pass along knowledge and enthusiasm for science by teaching at some time in their careers is detectable in many comments of these young people. The teachers of these outstanding students apparently have left a shining mark upon their future aspirations.

The annual Science Talent Search is conducted by Science Clubs of America, an activity of SCIENCE SERVICE, and is supported by the Westinghouse Educational Foundation.

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WINNERS MEET PRESIDENT—At the White House President Kennedy and Vice President Johnson talked science with the 40 winners of the Science Talent Search (See p. 166).

GENERAL SCIENCE

Top Science Talent Chosen

The scholarships of the 20th Annual Science Talent Search were won by two young biologists and three mathematicians. All five are already accomplished scientists.

► THE MOST PROMISING young scientist of the year is 17-year-old Joshua Wallman of New York City, who has been engrossed in biological research since he was 13 years old. His current investigation of the courtship bowing of the male ring dove upsets the theory that it is purely a reflex action due to instinct.

As top winner in the 20th Science Talent Search conducted by SCIENCE SERVICE, he has been awarded the \$7,500 Westinghouse Science Scholarship. The judges selected him from a field of 4,000 high school seniors from all over the nation who submitted completely qualified entries.

Four other scholarships were awarded: \$6,000 to Edward C. Jones, 17, of Arlington, Va., a nimble-minded mathematician who is especially concerned with the relationships between logic and language.

\$5,000 to William M. Adkins III, 17, of Melbourne, Fla., another enthusiastic biologist who has been absorbed in his various research projects since he was 14 years old.

\$4,000 to 17-year-old Daniel E. Kleinman of Louisville, Ky., who looks forward to a lifetime in the challenging field of modern mathematics and mathematical philosophy.

\$3,000 to a talented little feminine scientist, Harriet J. Fell, 16, of Flushing, N. Y., who is equally deft in abstract mathematics and zoological research.

Bowing Behavior of Dove

The investigation that top winner Josh Wallman reported as part of his entry concerned the ring dove and its bowing behavior during courtship. Observing that birds unable to inflate the esophagus did not go through this bowing ritual, the young ornithologist investigated the role of the esophagus in the characteristic bowing.

Working through two summers at the Institute of Animal Behavior of Rutgers University, Newark, N. J., he designed his own experiments and spent many hours observing and photographing the male dove. He concluded that inflation of the esophagus was stimulated by introducing a female dove into the cage and that, in turn, the air pressure in the esophagus triggered the bowing.

In addition to his work at the Rutgers Institute, Josh has carried out detailed studies of feathers and of the origin of the domestic ring dove, in cooperation with the American Museum of Natural History, New York.

Josh edits the Journal of Biology at the Bronx High School of Science, where he is now a senior, and serves as chairman of the field trip committee of the Linnaean Society of New York.

Ed Jones, senior at Wakefield High School in Arlington, Va., has developed a special appreciation of simplicity and elegance in mathematical structure. He hopes some day to devise a method of discovering whether some of the classical unproved mathematical conjectures belong to the group of theorems that are true but can never be proved.

Ed's Search paper dealt with convex smooth curves and some proofs and interesting conjectures about them. He proved several geometric theorems about "p" lines, formed by joining points in which the curve is met by a pair of parallel tangents.

Bill Adkins has already begun the contributions he hopes to make to the field of biology through future studies of every aspect of the role of glands and hormones in biological phenomena. In his Search report, Bill described a new technique he designed for studying the role of the pineal gland in animals, shielding the gland from light by using petrolatum and non-drying putty. He concluded that normal functioning of the southern toad's pineal apparatus in response to light is necessary to the well-being of the amphibian, since with the pineal shielded it chose higher temperatures and light intensities and dryer sand than normally preferred.

Now a senior at Melbourne High School, Fla., Bill pays particular tribute to his biology teacher who encouraged him to think independently and try out his own ideas.

Dan Kleinman demonstrated unusual understanding of the language of numbers as early as fifth grade, when he figured out by himself how to determine permutations. Now a senior at Atherton High School in Louisville, the young Kentuckian has devised a new and original approach to the twin primes problem, an unproved number theory classic which conjectures that there are an infinite number of prime number pairs of the form p and p plus two.

Understanding Prime Numbers

Believing that resolution of the question would be an important step toward complete understanding of the distribution of prime numbers, Dan formulated two questions, equivalent to the primes problem, which should facilitate further investigation because they do not deal directly with primes.

Harriet Fell, the feminine member of the outstandingly promising quintet, is also a mathematician. She reported on her investigation of the properties of a linear algebra with 16 units, which may have application to quantum mechanics and to determining vectors in five-dimensional

space. Harriet works as a volunteer assistant in the department of animal behavior at the American Museum of Natural History and is completing advanced courses at Jamaica High School, Jamaica, N. Y., in calculus, analytical geometry and history of science. Whatever leisure is left is devoted to painting, ceramics, accordian, guitar and harmonica. Her picture of the future includes both university teaching, in mathematics or zoology, and marriage and children.

Robert M. Axelrod, 17, of Evanston Township High School, Evanston, Ill., was named as alternate to the \$3,000 scholarship. Michael Clarke Newlon, 18, of Western High School, Washington, D. C., was named second alternate.

Eight girls and 27 boys received Westinghouse Awards of \$250 each in recognition of their top level ability and promise as creative scientists of the future.

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GENERAL SCIENCE

Talent Search Winners Meet President Kennedy

See Front Cover

► THE 40 Science Talent Search winners visited the President during the trip to the Science Talent Institute in Washington, D. C. (See also p. 165)

President Kennedy and Vice President Johnson greeted each winner personally and discussed the science projects and future plans of the young scientists.

The group had elected Roger Paul Peters, Jr., 17, South Bend, Ind., to present gold Science Clubs of America emblems to the President and Vice President.

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BEST SCIENCE TALENT—Scholarship winners with their Science Talent Search projects and activities at the Science Talent Institute in Washington, D. C. Top, left to right, Joshua Wallman, William M. Adkins III and Edward C. Jones.

Center, left, Major Paul E. Teschan, M.C., U.S.A., Assistant Commandant, Walter Reed Army Institute of Research, and the top winner of the first Science Talent Search, shows a germ-free operating chamber to winners. Center, the winners in front of the Capitol. Center, right, winners visit the Smithsonian Institution.

Bottom, left to right, Robert M. Axelrod, Daniel E. Kleinman, and Harriet J. Fell.