

GENERAL SCIENCE

1962 Advances in Science

Spacemen, both U.S. and Russian, spent many hours orbiting and a new era in international communications was inaugurated with Telstar, Watson Davis reports.

This summary is limited to highlights, and credit to investigators and institutions is necessarily omitted. If you want more information about any item in the summary, send 25¢ to help cover answering costs for each item upon which more information is requested. Address Science Service, 1719 N St., N.W., Washington 6, D. C.

➤ WITH HUMAN ASTRONAUTS spending days in orbiting spaceships and an acceleration of the race by Americans and Russians to get to the moon a few years hence, 1962 was another significant space year.

Despite perplexing problems on the face of the earth itself, the space frontier absorbs a significant portion of research and scientific effort and money.

The number of men who have spent time outside the earth's major influence rose to seven, four of them Russians and three of them Americans. In orbiting, the Russians' near success in rendezvousing two space capsules, bringing them within three miles of each other and landing them within minutes at a predetermined place, was a notable feat. The 95 hours spent in orbit by one of these Russian astronauts shows that weightlessness is not a barrier to space travel.

Telstar Launched

Less spectacular but no less significant were the successful launching of Telstar communications satellite by the joint U.S. industrial and Government efforts and the putting into orbit of a large array of other satellites for a variety of purposes: watching the weather, observing the sun, making military reconnaissances, providing navigational assistance and studying the hazardous radiation belts which are barriers to traveling into outer space.

Probes to other planets were launched, a Russian vehicle rushing toward Mars and the U.S. Mariner II passing relatively close to Venus.

With both East and West resuming atomic tests, a U.S. high altitude H-bomb blast created an artificial radiation belt which caused some concern. How long it would persist could not be predicted.

Development of rockets and missiles for defense purposes, which goes hand in hand with space exploration, continued at a rapid pace. The conversion of our defenses from manned aircraft to intercontinental ballistic missiles was signalized by the fact that manned jet bombers went out of production in the United States in October. Although the last B-52 was produced, there are, however, under design and pilot con-

struction supersonic bombers for reconnaissance such as the B-70, which is intended to fly 2,100 miles an hour.

On the earth itself, the top medical story, when viewed internationally in the future, probably was the development of a method of immunization against malaria, one of the great scourges of the world. This U.S. achievement, demonstrated by tests upon volunteer prisoners, prevents contraction of this mosquito-borne disease for a year or more by single injection of a chemical, CI-501, a complex pamoic acid salt, which may prove curative as well as immunizing.

Drug Dangers Emphasized

The dangers in the introduction of new drugs for medical treatment were emphasized by the tragedy of malformed babies due to thalidomide, a tranquilizer, used by women in early pregnancy. Although not licensed for prescription use in the United States, it was under clinical tests which were stopped when reports from Europe showed its dangers. The thalidomide tragedy reinforced new safeguards on drug research, manufacture and distribution.

A vaccine against measles came closer to availability to the public and the discovery

of the German measles virus may lead similarly to a preventive vaccine in the future.

The first nuclear-powered surface ships, the cargo-carrying NS Savannah and the nuclear frigate, the Bainbridge, underwent successfully their initial sea trials, joining the U.S. fleet of nuclear submarines.

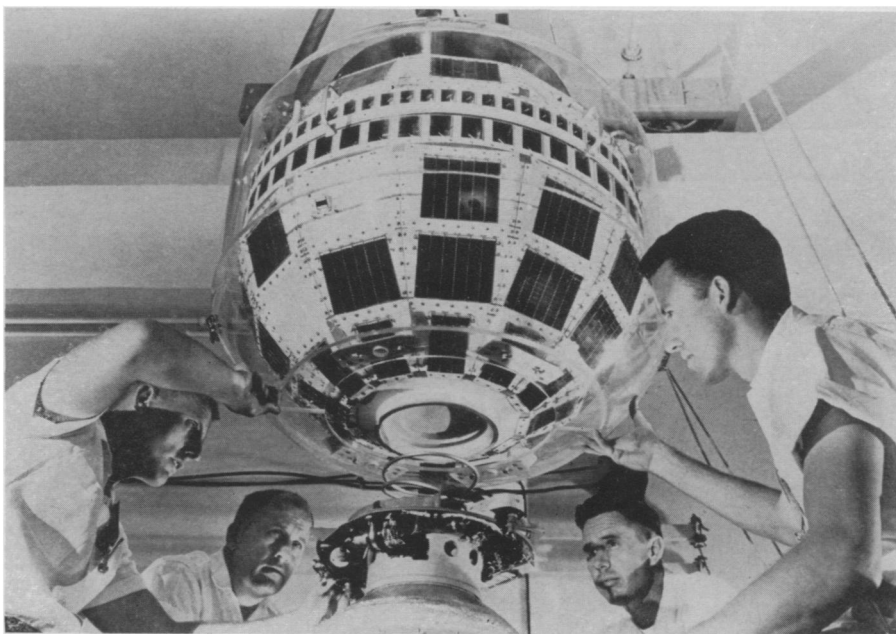
The world's largest nuclear power plant at Hanford, Wash., was authorized by Congress and the development of nuclear portable power plants for special purposes continued successfully.

Atom Nucleus Explored

Exploration of the nucleus of the atom continued and the discovery of a new nuclear particle called "f-zero" was made and this suggested that the structure of matter could be viewed as requiring no elementary particles but only one which manifests itself in continually changing forms.

The particles, eta, rho and zeta mesons, were also discovered and existence of an alpha meson seems assured. Another discovery was made in the 30 BEV synchrotron at Brookhaven National Laboratory, which showed the existence of two types of neutrinos, each of which has its anti-particle, important in the nucleus.

Lasers, which are devices to concentrate light by means of devices such as ruby crystals, found new uses. One laser light beam was bounced off the moon. Optical



American Telephone and Telegraph

TELSTAR COMMUNICATIONS SATELLITE—Technicians of Douglas Aircraft Company are shown mating the Bell Telephone System's experimental communications satellite, Telstar, to the third stage of a Delta rocket, which was used for launch. Under a cooperative agreement, the National Aeronautics and Space Administration launched Telstar for the American Telephone and Telegraph Company, which reimbursed the Government.

masers were under study for use in computers, instead of electronic tubes or transistors. A new kind of laser was generated by passing electricity through a semiconductor.

The advanced development of photo reconnaissance from the air and the use of so-called "spy" satellites for military purposes was emphasized by U.S. intelligence in the Cuban crisis in October. Both conventional photographs made through special aerial cameras of improved design and infrared photographs have developed significantly for use in surveillance from both the air and space. No part of the globe that needs watching will be hidden from any nation with the means of such aerial reconnaissance.

A major field of research deals with photosynthesis or the harnessing of the sun's energy for practical purposes. As a first step in developing more effectively the chemistry of photosynthesis in harnessing and possibly industrializing it, scientists in a few laboratories have studied intensively the process of conversion of solar energy into food in the living plant. Discoveries relating to the electronic aspects of the final stages of the photosynthesis process in plants may be utilized in the future to solve more completely the puzzle of how the plant operates and future years may look back upon 1962 progress as an important step forward. The primary act of conversion of energy in photosynthesis was found to involve the separation of negative electrons from the positive "holes" electrons leave behind when they move.

Genetic Code Research

Progress in understanding the genetic code of the life-building chemicals, DNA and RNA, indicated that in the near future there will be attempts at changing heredity even in human beings. Nobel prizes of the year increased to 11 within a period of four years those that were given for molecular biology and chemical genetics.

By several different processes, the conversion of brackish water or salt sea water to fresh water was pioneered during the year in a number of government-subsidized plants. Enough progress has been made to foresee in the future a competitive cost that will allow such conversion to be undertaken practically in some water-scarce areas such as southern California.

Because of its bearing upon racial integration, discussion of the origin of man and various races was renewed. There were anthropological resolutions during the year which stated that there is no scientifically established evidence that Negroes are biologically and innately inferior to whites. This has significance to the racial integration efforts in the United States and the impending conflict between new Negro-dominated republics of Africa and white-dominated areas, such as South Africa, practicing segregation.

The ancestry of man, known from relatively meager skeletal remains in Africa, Asia and Europe, underwent a constant appraisal because of new studies and new discoveries. Under development was the

possibility that the Neanderthals were an ancestor of modern man rather than a dead branch on the *Homo sapiens* family tree. While scientific communication with Communist mainland China is difficult, there may have been discoveries of fossil men which would have bearing upon the question of human ancestry. Africa produced a 14-million-year-old fossil that may prove to be in man's ancestry.

In the wake of the very successful International Geophysical Year and its stimulation to research on man's side of outer space, plans were made during the year for ambitious and well-funded inquiries into the oceans and the crust of the earth. The Indian Ocean survey, a joint effort of many nations, was inaugurated. A new inquiry into the upper crust of the earth, supple-

menting the daring attempt already underway to drill down to the core of the earth, was proposed.

Upon the model of the International Geophysical Year, the preparations were made for the International Year of the Quiet Sun in 1963-64, during which 36 nations will conduct a program of solar research during this minimum in the 11-year cycle of sunspot activities.

Man's continuing battle with the insects, which, if allowed full sway, would prevent much of modern agriculture, was given new attention and emotional content by the publication of a book which argues that damage is being done by the use of the insecticides necessary to insure food production.

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1962 Science Review

Detailed highlights of achievements of the year reported and compiled by Science Service as a record of an eventful period of science, research and technology.

ANTHROPOLOGY AND ARCHAEOLOGY

Missing Link in Origin Of Man Believed Found

Teeth and palate fossils of a 14-million-year-old creature, closer to the family of man than that of the apes, were found in Kenya, Africa, and pronounced a link in the origin of man.

Neanderthal man, long believed an apelike creature from a dead branch on man's family tree, was found to be a probable partial ancestor of modern man.

Six new kinds of fossil men were unearthed in Communist China, providing information about the years between 1,000,000 and 10,000 B.C.

Excavations at Yunque (San Gabriel), New Mexico, revealed that this site, at the junction of the Rio Grande and Chama Rivers, was the first permanent European settlement in the U.S., 78 years before the Pilgrims landed at Plymouth Rock.

An electronic computer was used to date Babylonian clay tablets by determining the positions of the sun and planets for the period between 601 B.C. and 1 A.D.

The American Anthropological Association adopted a resolution stating that there is no scientifically established evidence that Negroes are biologically and in innate mental ability inferior to whites.

Archaeologists used instruments that measure slight changes in the magnetic field and electrical resistance of soil to investigate a wall of the ancient Greek city of Sybaris and some Etruscan tombs, without first unearthing them.

Pollen of fir trees in Shanidar cave in Iraq revealed that Neanderthal man of the area lived in a cold climate some 60,000 years ago, and in a considerably warmer climate some 45,000 years ago.

Ten thousand bamboo strips, inscribed with ink and brush, were discovered under desert sands bearing information about nomadic Chinese tribes during the Han dynasty some 2,000 years ago.

A prehistoric water system of ditches and

channels and a large reservoir, probably dug in 1150 A.D., were discovered in Mesa Verde National Park, near the southwest corner of Colorado, indicating that pre-Columbian Indians of the area knew more about hydrology than was previously believed.

Using infrared spectroscopy, scientists analyzed the dyes of textiles from around 135 A.D., located in caves near the Dead Sea, among the remains of a group of followers of Bar Kochba, who fought one of the last battles of the Jews against the Romans.

The ancient city of Gibeon reportedly had a civil defense system, consisting of an inner and outer wall, and a tunnel to a nearby spring by which to obtain water in the event of a siege.

ASTRONOMY

Gravitational Red Shift Of Sun Verified Directly

The gravitational red shift of the sun's radiation predicted by Einstein's general theory of relativity was confirmed directly for the first time, using a new technique relying on variations in the earth's gravitational field over a distance of several feet vertically.

Preparations were made for the International Year of the Quiet Sun, 1963-1964, a 36-nation program of solar research during sunspot activity minimum in the 11-year cycle.

Observations of the Zeeman effect with the British giant radio telescope confirmed the existence of the Milky Way's magnetic field, it was reported.

An intense source of X-rays was discovered in the region of the constellation Scorpius.

The mean distance from the earth to the moon was found, by three different methods, to be 238,866 miles, accurate within approximately one mile.

A new theory of the 11-year sunspot cycle held that it is due to the different rates of rotation of charged atomic particles in the sun.

Protoplasm, the stuff of living things, is possibly found on the millions of cool dark stars in the far reaches of outer space, a new theory advocated.