

Science Forecast for 1965

Steps toward moon and Mars scheduled, possible discovery of the fifth force, beginning of International Hydrological Decade, more science surveys are on 1965 program.

By WATSON DAVIS

► ASSUMING THE continuance of the world's armed atomic truce during 1965, there should be many scientific developments based upon the progress of past months and years and research in progress. If an atomic war or even an extension of non-atomic war, possible in Viet Nam, the Congo or Indonesia should occur, this may interfere with the continuance of scientific achievement by diverting attention and funds.

Some of the developments for 1965 that can be foreseen are:

There will be flights of more U.S. astronauts in the Gemini program in preparation for the trip to the moon. Two astronauts will orbit the earth for periods up to two weeks, thus discovering the problems and possibilities of the longer flights, which at the end of the decade are scheduled to go to the moon.

Life on Mars?

Mars and the possibility of life of a low order upon it will command attention. The flight of the probe which has been launched toward that ruddy planet will reach there in July. Even if some phases of its flight are not successful, there will be planning for another attempt when the juxtaposition of the planet earth and the planet Mars are again favorable for an exploratory probe and picture-taking attempt. The Russian probe toward Mars will pace the U.S. Mariner.

Other probes and satellites will be launched. Among them will be a solar observatory and a second Orbiting Geophysical Observatory. Scientists will gain increasing knowledge of the earth upon which we live as sensed from a vantage point in an orbit around the earth.

The new regime in Russia may make changes in relationships with the United States, the effects of which cannot be fully predicted. The likelihood is that the atmosphere of relatively peaceful cooperation in science will continue, despite difficulties in the United Nations and the seeming determination of the Russians to go it alone in space. Overtures, past and future, of the United States for joint expeditions to the moon and beyond have little chance of favorable reception.

There will be some expansion of the token inspections of atomic reactors by international teams of the International Atomic Energy Authority, to make sure that the fissionable material used in power reactors is not diverted to bomb-making.

The number of atomic bomb countries may be increased beyond the present five. The production of a thermonuclear weapon cannot be predicted, but it would not be surprising to have a Chinese hydrogen bomb as well as fission bombs by other countries who wish to flex their atomic muscles.

The demand for water, both fresh and drinkable, and for irrigation in many parts of the world will speed the utilization of dual purpose atomic power plants that will serve for desalination of water and the production of electrical power. In various parts of the world, but particularly in the United States, plants of this sort will be begun on a test basis during the year.

New Atomic Industry

A new industry and a new application of atomic energy will come to commercial fruition during the year by putting plastics into wood and then solidifying them or polymerizing them by means of atomic radiation. The wood is modified and made into a more useful product.

Highly organized international cooperation in science research of global significance was successfully inaugurated by the International Geophysical Year, which was actually a longer period. This specialization over a period of time has been continued through the Year of the Quiet Sun, which extends through 1965. The sun has been almost too quiet. The unexpectedly lower level of solar activity has not given the mobilized observation nets as much to study as scientists wished.

A 10-year period of research devoted to water on earth is to be inaugurated with 1965. Although in process of planning for several years, the special objective of the International Hydrological Decade will be to understand the mechanism on the earth for distribution of fresh water throughout the globe. This includes not only the weather but circulation of ground waters accumulated. At least 60 nations are participating in the 10-year program. The international arrangements were planned by UNESCO, with the help of the National Academy of Sciences in this country. The U.S. Geological Survey will continue to study the structure of the earth's crust and the upper mantle of the earth and explosions of a conventional type set off in Lake Superior will be analyzed and their findings and meanings announced.

Expanding oceanographic research of the world will be aided by the commissioning of two new research vessels, the most modern oceanographic ships in the world

named the Discoverer and the Oceanographer. They will be operated by the U.S. Coast and Geodetic Survey.

Telescope in Sky

The continuing exploration of the universe, particularly beyond the solar system, which is now the subject of actual probes launched from the earth, will continue with the placing in operation of a considerable number of aids to existing telescopes. Called image tubes, they collect radiation and record it electronically. These devices will triple in effect the seeing and viewing power of existing telescopes. There should therefore begin to appear in the coming year some of the enhanced results of astronomical explorations.

Even this increase in the power of telescopes could not bring us proof of planets of even the most nearby stars although that is a hope of the astronomers of the future. Astronomers are convinced that there are many millions of such planets of the millions upon millions of star-suns in the universe. They cannot conceive that the sun with its planet system is the only stellar object that possesses planets. Probing the universe through detecting radio waves from outer space will be continued. Among the radio astronomy endeavors will be a continued watch for the signals from outer space that come from intelligent beings, a very long shot endeavor about which astronomers are nevertheless very determined and desirous.

Stratoscope II, Princeton University's 36-inch balloon-borne telescope, will take at least one photograph of high quality of the Andromeda Nebula, or M-31, or possibly of another spiral galaxy.

Having successfully completed two flights during which it made infrared spectroscopic observations of cool red giant stars, the planets Jupiter and Mars, and other objects, Stratoscope II will be used for direct photography, the task for which it was originally designed. Among the specific objectives are such planets as Jupiter, Saturn and Uranus, globular star clusters and double stars.

Fifth Force?

The search for a fifth force in the universe now underway both at Brookhaven National Laboratory in the United States and at CERN in Geneva will be concluded. The four known forces are gravitation, electromagnetism, nuclear and weak interactions. The intensive quest for a fifth force is being made because experiments last summer showed that a principle called invariance of time reversal apparently did not hold in a few cases of the disintegration of a nuclear particle known as the K-two-zero meson. To explain this seeming violation of a principle previously never questioned,



Perkin-Elmer

TARGET FOR STRATOSCOPE—
The 36-inch telescope to be carried aloft by Stratoscope II during 1965 to an altitude of some 80,000 feet is scheduled to take a searching look at the Andromeda Nebula, or M-31. The telescope's field of view is shown by the black square in this photograph of the Andromeda Nebula.

scientists suggested the possibility of a fifth force.

Due to the U.S. program for detecting atomic explosions in the earth and in the atmosphere, the world has a much larger network of seismographs in continuous operation than ever before. These instruments will detect not only atomic explosions but also will give new information about the vibration and movement of the earth's crust. A continuous measurement of strain and changes in movements in the earth's crust, particularly in earthquake regions, has been undertaken and this build-up of strain and sub-surface sounds they produce may eventually lead to the prediction of earthquakes. This hope on the part of geophysicists is being explored and may come to some conclusions in the coming months.

Some of the seismographs that are used in this enhanced exploration of the uneasiness of the earth are placed at the bottom of the ocean in order to give a coverage of the whole earth's area.

Supersonic transport planes, which will bring to commercial aviation in a number of years, if plans progress, the speed of the warplanes that have made their appearance in the past year, will have 1965 as their year of decision. The supersonic transports traveling at approximately three times the speed of sound, made of titanium metal in large part to conquer the difficulties of heat due to their extreme speed through the air, will be able to reduce time from coast to coast or across the Atlantic to a matter of an hour and a half or so. The decision as to what kind of plane is to be built and just how much of its cost the Government

should defray will be made not too late in the year. When these Mach 3 planes are available they will usher in an era of transportation as advanced as the jet age was over the propeller planes of earlier years.

The isolation of the human leukemia virus may be expected in the coming months. A vaccine for preventing leukemia, a blood cancer, may follow, perhaps not in the year ahead. This may be the first successful vaccine for one of the variety of diseases that are called cancer. Before there can be further conquests by vaccines of other cancers, undoubtedly much more research will be needed, but the probability is that most of the cancers are virus-caused with such factors as chemicals and other carcinogenic agents triggering the virus effect.

The extensive research program throughout the world directed at understanding, preventing and curing cancer, is probably as amply supported as any research program in the history of the world. Any well-implemented research idea can today get support if it has the possibility of throwing light on the cancer problem.

The extraordinary financial attack upon cancer is not an assurance that the problem will be solved, even eventually, but the chances are there will be significant gains if not in the coming year, at least in the years to come.

Insects Troublesome

Some of the diseases carried by insects may become troublesome again because the insects have learned to live with the insecticides that have been so successful keeping them under control. Mosquitoes carrying yellow fever and malaria have given some indications that they have become less susceptible to the insecticides. Work will continue with chances of restoring man's control.

More stringent rules for drugs that are sold on prescriptions result from the application of the new drug laws. However, the development of new pharmaceuticals that make the control of disease and the alleviation of suffering more effective will continue.

Pharmaceutical companies will be introducing new and better agents for use by physicians in their practice.

As a result of long-term experiments on the effects of diet upon body functions and longevity, scientists are coming to the realization that it is combinations of food rather than one individual food that is important in controlling the cholesterol levels in blood serum, which are thought to have a good deal to do with the build-up of deposits in the arteries.

The National Academy of Sciences, which has as its function of advising the President and the Federal Government on various programs of scientific research that are needed, will continue looking into what the Government should do in certain basic fields of science activity.

Additional task force reports to Government and people will be issued from the National Academy of Sciences. These will be of the same long look as the ones on astronomy and space that have charted

increasing attention to these specific important areas.

Future reports will cover the whole field of physics, chemistry, botany, uses of computers. There will also be a report outlining the 10-year program of the solid earth.

Man's Ancestors

New anthropological discoveries and research on *Homo habilis*, a fossil of a human species that lived in Africa almost two million years ago, will settle the dispute that this is an older human fossil than *Telanthropus*, a genus of South African fossil hominids considered intermediate between true man and the ape and believed to have lived some 700,000 years ago. Anthropologists now believe that nature tried out several man-types from a common ancestor, some of which became apes, one which became *Homo habilis*, whose fossil was discovered by British anthropologist Dr. Louis S. B. Leakey in Tanganyika, and others which became man-like but not directly related to him.

The search for ancient man continues in other parts of the world and an excavation of a cave near Tashkent in the Soviet Union is expected to yield Neanderthal remains.

The revolution in science education continues at a speedy pace with the greatest activity now taking place at the college level where the courses need to be adapted to give effect to the improvement of science teaching in the elementary and secondary schools. The probability is that it will be possible for college students of the future to be better prepared and with more knowledge of science and technical possibilities than they have been in the past years.

Third Force for Change

Mass protests, whether accompanied by riotous violence or of the non-violent Indian-CORE variety, are a third force to bring about change.

The first force is war. The second force is the peaceful change of democracy through the ballot box or slower cultural modification, often aided by propaganda and advertising.

The kinds of behavior which erupt throughout the world, from the University of California campus at Berkeley to Viet Nam and Indonesia, are symptoms of the uneasiness of youth and its opposition to authority, even if sparked by subversion.

The tantrums of a child in the home of loving and doting parents have relationship to the protests that we read about.

How should the situation be handled and order restored? Spanking in the home? Or police and soldiers in more adult riots? Let the baby yell? Or feed the child? Let the protesters sit-in? Or give them a Hyde Park?

It has been suggested that a solid scientific, sociological and psychiatric inquiry, implemented by a foundation or Federal grant, might be focused upon this problem, using the extensive experience and literature of those who have learned to handle conflict peacefully.