GENERAL SCIENCE

Science Forecast for 1956

Boundaries of universe will be pushed outward by new device added to giant telescopes. H-bombs will be tested. Radiation controversy will continue. Tornado forecasts expected.

By WATSON DAVIS

See Front Cover

➤ DURING 1956 there will be continued attempts to solve some of the major problems in the application of science to the world.

One of these is the effect of atomic radiation upon the human present and future, which will be considered by a United Nations commission. It will, however, continue to engender controversy.

The atomic competition between Soviet and Western groups was clarified but also sharpened by the successful meeting of atomic scientists of the world at Geneva last August to discuss peaceful atoms.

The possibility of atomic power from the fusion of light (hydrogen) elements has been conjectured for several years, but at the Geneva conference major atomic powers admitted research programs are under way. Nevertheless it is too much to expect results in the coming year.

The number of fission (uranium) power plants building will continue to grow, with the possibility that the British 60,000 kilowatt reactor will begin operation about mid-year. In the United States seven major atomic power plants should be under design or construction at the end of 1956, but none will be completed by then. Do not be surprised if the Soviets claim atomic submarines to match the atomic sub fleet we are building to join the U.S.S. Nautilus.

The testing of atomic weapons will continue, with H-bomb explosions by the United States, Russia and Britain.

In the United States and presumably in Russia there will be almost frantic emphasis on intercontinental ballistic missiles to replace long-range bombers for delivering H-bombs accurately to the other side of the globe. This research is wrapped in secrecy.

Image Converter

Less concerned with what happens on earth is the development of a means of pushing farther out the known boundaries of the universe. In effect, the application of an electronic device, an image converter, should increase the power of the giant telescopes ten-fold. The great 200-inch telescope on Mt. Palomar, world's largest, now reaches out into space so far that it takes light about six billion years to come to earth.

Does the universe extend ever outward? How much farther? When the image converter goes into service during 1956, more information regarding depths of the universe will be obtained. It will observe stars now beyond reach, and it will also obtain stellar spectra in shorter exposure times than heretofore.

It will make it possible to learn more about island universes like the Andromeda Nebula shown on the front cover of this week's SCIENCE NEWS LETTER.

The image converter may make unnecessary the building of telescopes larger than 200 inches. The famous 100-inch on Mt. Wilson through its aid is expected to be the equivalent of a 1,000-inch telescope. The 200-inch telescope should do the work now of a 2,000-inch telescope.

Thus the limits of human probings of the universe are pushed outward again, considerably more spectacularly than the improvements made in the past decade through the use of better photographic plates.

The most recent of big telescopes, a 120-inch instrument of Lick Observatory on Mt. Hamilton, Calif., will begin operation during the year to become the world's second largest telescope.

Always curious about our own solar system, astronomers will use television techniques, such as the image converters, to try to photograph for the first time the so-called canals on Mars. In determining distances in the universe, globular clusters will be used as one yardstick to measure distances.

Check Against Atomic Clock

The earth's rotation rate and lunar motion will be checked against the super accurate atomic clocks using cesium and ammonia, thus comparing gravitational and atomic time keeping. Atomic clocks have an accuracy of one part in a hundred million or a billion.

At the other end of the scale of the universe, within the heart of the atom, there will be continued exploration of subatomic particles. The bevatron, world's largest atom smasher, which produced anti-protons in 1955, will yield needed information about the spins and other properties of the "strange particles," K-particles and hyperons.

In the accelerating application of electronic computers to many problems and tasks, you can expect these devices to take on a new facility to understand instructions in plain English and then work out and set up their own programing, telling them what to do. Instead of weeks of work by mathematicians, the computer will work out its own instructions by itself in minutes. Computing machines will be developed in which the internal mechanisms for doing things like square roots are replaced by programing.

Machines will be applied to the retrieval of information without the need of elaborate, time-taking classification procedures, and one of the first applications which may begin in 1956 will be to the Patent Office files and to scientific literature.

Expect a concentrated attack on hurricane and tornado forecasting problems by the U. S. Weather Bureau in the coming year. There will also be an expansion of both surface and upper air observations over the seas on merchant ships, ocean buoys, civil aircraft, and offshore commercial and military installations. Techniques will be improved for the reporting and forecasting of flash floods.

The man-made satellite that is due to be launched by rocket in 1957 will undergo promising development and there may even be some preliminary trials of early versions.

To the continuing problems of the mechanism of photosynthesis, the nature of life, and structure of amino acids important to living things, there probably will be no definite conclusions, but research will continue.

As in the case of the nature and treatment of cancer, heart disease, and other great, unconquered diseases, there may be "break-through" but this may be too much to expect. There is hope that there will be further steps toward the early detection and diagnosis of cancer.

With the mass use of the Salk vaccine for polio, the coming year will bring continued and more extensive use of this measure with further evidence of its safety and effectiveness. There should also be progress toward the use of similar vaccines in other virus diseases.

Tuberculosis is being fought chemically through the use of isoniazid and such progress will continue in the coming months.

The spread of the disease, infectious hepatitis, through the serum plasma of blood transfusions, will be prevented by methods of processing pooled bloods to be developed in the coming year.

The immense drain of mental illness upon our civilization will be lessened through the continued application of tranquilizing drugs to mental patients. You can expect the promising developments of the past few years to continue. The most promising of these drugs are chlorpromazine and reserpine, but it may well be that we shall see further drugs developed in the coming year which will be useful in treatment, not as panaceas, but in making the patient more comfortable and accessible to phychotherapy.

Personality development research will be undertaken with greater intensity because of the prospect that it will give aid in handling the troublesome problems of juvenile delinquency.

The exploration of the past, particularly the early history of the human race, holds fascination for scientists and laymen alike. The bones of the earliest Americans, whose ancestors are believed to have come over from Asia, may in the near future be unearthed in Arctic America. In Africa the focus is upon the remains of early man and his ape-man ancestors, and there is hope that in the not too distant future they can be dated.

Impressive progress will be made toward the supplying of scientists, engineers and technologists for the future through about a hundred science fairs throughout the country in which some 70,000 high school youth will participate, with the National Science Fair as a culmination.

Postmortem on 1955 Forecast

The science forecast for 1955 issued a year ago shows a good degree of fulfillment.

There were more atomic test explosions by both the United States and Soviet Russia and there was rising fear of the consequences of the increasing numbers of tests, as predicted.

There was an atoms-for-peace meeting, held outside the United States, and it was chiefly important because atomic rivals talked to each other for the first time.

America's first atomic submarine did make a record sea voyage.

There was progress in understanding the evolution of the stars and the structure of the universe. The expanding universe did take on new dimensions due to a revision of astronomical constants.

A giant electronic computer did go to work making numerical forecasts of the weather.

A vaccine for measles, made by the same methods as the polio vaccine, did not come to the testing stage as was expected.

While research continued on photosynthesis, as was expected, discovery of the mechanism of capturing sun's energy was not achieved.

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Serivce.

THE BIOCHEMISTRY OF VITAMIN B_{12}: A Symposium Held at the London School of Hygiene and Tropical Medicine on 19 February 1955—R. T. Williams, Ed.—*Cambridge University Press,* Biochemical Society Symposia No. 13, 123 p., $3.75.

CAT GENETICS—A. C. Jude—*All-Pets,* 126 p., illus., $4.50. A non-technical discussion for the cat owner.

A CENTURY OF PROGRESS IN THE NATURAL SCIENCES 1853-1953—Edward L. Kessel, Ed.—*California Academy of Sciences,* 807 p., illus., paper, $10.00. A collection of essays reviewing the accomplishments of the past hundred years.

INDUSTRIAL SOCIETY: The Emergence of the Human Problems of Automation — Georges Friedmann, introduction by Harold L. Sheppard, Ed.—*Free Press,* 436 p., $6.00. To help scientists to climb out of the grooves of their particular specialties.

MASS TRANSFER OPERATIONS—Robert E. Treybal—*McGraw-Hill,* 666 p., illus., $9.50. The physical operations described here have come to be the responsibility solely of the chemical engineer. For graduate students.

MINERAL RESOURCES NAVAJO-HOPI RESERVATIONS, ARIZONA-UTAH: Volume III, Construction Materials—Geology, Evaluation, and Uses—George A. Kiersch and others—*University of Arizona Press,* 81 p., illus., paper, free upon request to U. S. Bureau of Indian Affairs, Window Rock, Ariz. The Navajo country is the site of many natural construction materials.

PINYON RESOURCES: Distribution of Pinyon *(pinus edulis)* Yield and Resin Potentialities, Navajo-Hopi Reservations, Arizona-Utah — Chester R. Deaver and Horace S. Haskell—*University of Arizona Press,* 37 p., illus., paper, free upon request direct to U. S. Bureau of Indian Affairs, Window Rock, Ariz. Report of a study made under contract with the Bureau of Indian Affairs.

USE AND CONSERVATION OF WATER RESOURCES IN EASTERN STATES—Richard D. Hoak—*Mellon Institute,* 8 p., paper, free upon request direct to publisher, 4400 Fifth Ave., Pittsburgh 13, Pa. The humid eastern states which have long enjoyed an abundant water supply are now beginning to feel the pinch of water shortage.

WHAT I HAVE LEARNED BY LIVING—Henry J. Burt—*Bruce Humphries,* 147 p., $3.00. Results of fifty years, not only of a scientist's living, but of his pondering and teaching.

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PLANT PATHOLOGY

New Plant Disease Discovered in U. S.

➤ A NEW agricultural fungus disease, previously unknown in the United States, has been discovered in Mississippi, scientists with the U. S. Department of Agriculture and Mississippi Agricultural Experiment Station report.

The disease, a downy-mildew of crimson clover, is caused by a fungus, *Peronospora viciae,* which does considerable damage to crimson clover in sections of Europe. The disease has not yet become damaging in the United States.

Leaves of infected crimson clover appear yellowish gray to purple from above and are often curled.

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