

GENERAL SCIENCE

# Science Today and Tomorrow

## Surveys and Prophecies in Varied Fields Prepared By Five Leading Men for Yale Review's Anniversary

**A**VIATION in 1950, cosmic rays as tools for studying the ancient history of the universe, the source of stellar energy, long range weather forecasting and invisible filterable viruses.

These are but a few topics in the cross-section of today's and tomorrow's science as presented in the *Postbag*, appearing in the 25th Anniversary issue of *The Yale Review* (Sept. 20). Leading men of science in varied fields contributed to the symposium.

### Morgan on Filterable Viruses

Study of the invisible filterable viruses, that act as though they were alive in some ways yet seem to be non-living chemicals in others, offer oncoming young biologists the chance to get closer to that elusive line that separates the living from the dead, Dr. Thomas Hunt Morgan, Nobel Prize winner of the California Institute of Technology, pointed out.

Further "leads" in the same baffling problem are offered by investigations on the vitamins, some of which have recently been produced in chemically pure form for the first time, and by researches on the hormones, or secretions of the ductless glands, particularly the sex hormones and those that promote growth in plants.

Recently opened up lines of investigation on nerve action Dr. Hunt also regards as promising, in particular those that have to do with the gland-like activities of nerve endings in secreting substances that stimulate body-parts to action, and the detection of minute but definitely patterned electrical currents, made possible by the modern development of the vacuum tube.

In the field of genetics where he himself gained fame, Dr. Morgan considers the most important recent developments, which also hold most promise for the future, to be those having to do with the mutations, or sudden changes, in the genes which determine the course of organic heredity, and, of even greater significance, the new methods of accurately mapping the location of the genes on minute but definitely described subdivisions of the chromosomes.

### Compton on Cosmic Rays

Reviewing the unanimity of experimental evidence that cosmic rays come to the earth from the depths of outer space, are affected by the earth's magnetic field and are mostly electrical in nature, Dr. Arthur H. Compton, professor of physics, University of Chicago, states:

"A fascinating point is that the rays appear to come from such great distance and such remote time as to suggest the possibility through their study of learning something regarding the ancient history of our universe."

While the science of physics has learned much about the outer cloak of the atoms, the Nobel Prize winning scientist adds, the inside nuclei offer a much more difficult field of research.

"The inner nucleus, about which this electrical atmosphere spreads, has remained an unconquered citadel. Rapidly, however, breaches in the walls of this castle are being made, and spies in the form of high-speed particles are bringing us information regarding the inner fortress. Important knowledge has been gained from the studies of radioactivity which were started early in the present century. Artificial disintegration of the atom's nucleus, first accomplished by Rutherford during the period of the Great War, has within the past half decade become an important tool of investigation. One of the most striking recent developments has been that of Fermi in building up heavier atoms out of lighter ones, which has led to the discovery of a whole new series of artificial radioactive elements."

### Russell on Galactic Size

Latest determinations of the size of the galaxy of which the earth and sun are a part indicate, Prof. Henry Norris Russell, Princeton University astronomer, reports, the diameter is so great that a ray of light, traveling at 186,000 miles a second, takes about a hundred thousand years to cross it.

The whole galaxy, he adds, is rotating

about a center which is some 30,000 light years from the sun. One revolution of the galaxy is completed in roughly 200,000,000 years.

The mechanism which makes possible the pouring of radiant energy into space, which the stars have been doing for millions of years, is still a mystery. Prof. Russell states. The enormous liberation of energy is too great to arise from any known source except atomic transformation.

"Now that such transformations—sometimes liberating enormous energy—have been produced in the laboratory," Prof. Russell declares, "there is hope that real advances in our understanding may come within a few years."

### Abbot on Long-Range Weather Forecasts

Students of weather and climate will await with interest the publication of long-range forecasts made for 1935 and 1936 by Dr. Charles Greely Abbot, secretary of the Smithsonian Institution, based on his now famous 23-year climatic cycle. A forecast for 1934, which Dr. Abbot published recently, agrees to a high per cent. of accuracy with the actual weather for that year. The forecasts for the current year and 1936 he is withholding from publication until he can give them a similar check-up with the actual events, "lest the results for 1934 prove exceptionally favorable and thus misleading."

### Warner on Aviation in 1950

Researches aiming for increased efficiency of present-day types of airplanes are rapidly reaching a state of diminishing returns, reports Edward P. Warner, member of the National Advisory Committee for Aeronautics and editor of *Aviation*.

The physical laws underlying airplane flight are setting up positive barriers that are already being closely approached in modern planes.

"Air transport in 1950," Mr. Warner declares, "may move a third faster than in 1935, or it is equally possible that the increase in speed will be negligible, but its costs of operation ought to be down by a third or more." (*Turn to Page 221*)

plains. Buffalo grass is highly resistant to drought, will stand all but the most extreme cold, and with its everlasting habit of sending out "runners" like those of a strawberry plant it keeps an uninterrupted year-after-year hold on the soil.

It is as good food for cattle as it once was for the native bison, it can be made into handsome lawns and well-kept golf courses, and in general it offers to be a better vegetable citizen of the West than many of the "fancier" immigrant plants that have been unable to "take it" when the pinch comes. Government and state scientists have carried out experiments with it along a number of lines, and they recommend it highly.

It does, however, need encouragement to re-establish itself where it has been plowed out. It was thought at first that if an abandoned field were just left alone the buffalo grass would reclaim it. But experience has shown that this will not take place fully in less than 20 or 30 years, and in the meantime less desirable grass species and weeds will be in possession.

Fortunately, its growth habits make it fairly easy to propagate. It will grow from seed, it will take hold as solid sheets of transplanted sod, and chopped-up sod bits send out their runners to extend and solidify their little conquests in quite rapid fashion. A recent circular of the U. S. Department of Agriculture gives practical suggestions for those who would aid nature in re-establishing the West's ancient mantle of buffalo grass.

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#### SEISMOLOGY

### Quake Shakes Sea Bottom Off British Columbia

**A**N EARTHQUAKE of moderate severity shook the sea bottom off the coast of British Columbia on Tuesday afternoon, Sept. 24, at 5:12.2 p. m., Eastern Standard Time. The location of the quake's epicenter, in latitude 50 degrees north, longitude 131 degrees west, was worked out by seismologists of the U. S. Coast and Geodetic Survey from data transmitted by wire through Science Service.

Stations reporting were those of the Dominion Observatory, Ottawa; the Dominion Meteorological Observatory, Victoria, B. C.; Pennsylvania State College; Georgetown University, Washington, D. C.; the private observatory of Mrs. M. M. Seeburger, Des Moines, Iowa; the University of California, Berkeley, Calif., and the observatory of the U. S. Coast and Geodetic Survey, Chicago, Ill.

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#### ASTRONOMY—AVIATION

## 200-Inch Telescope Mirror Now Nears Room Temperature

### Announcement That Huge Disk Will Not Be Ready Until December Changes Army Plans for Huge Airplane Wing

**T**HE giant 200-inch diameter glass disk, which eventually will be the great mirror for the observatory of the California Institute of Technology on Mt. Palomar, will be removed from the annealing ovens at the Corning Glass Works within the next month.

The temperature of the huge glass disk is now 302 degrees Fahrenheit, still far above the temperature of boiling water at 212 degrees. The carefully controlled cooling will have so progressed, however, that it is expected that the disk can be removed from the annealing ovens between October 15 and November 1.

Approximately two months later the disk will be placed on its specially built flat car for shipment to California. Tentative date for shipment is between December 15 and January 1.

Announcement that the giant 200-inch glass disk from the Corning Glass Works will not be shipped until the middle of December has altered the plans of the U. S. Army Air Corps to use the specially built flat car to transport east a huge airplane wing now under secret construction at the plant of the Douglas Aircraft Co. at Santa Monica, Calif.

The glass disk, destined for future use as the world's largest telescope mirror, is sixteen feet in diameter. The chord of the huge airplane wing—the distance front to back at the widest point—is approximately the same size.

Aviation officers at Rockwell Field, Calif., had been investigating the possibility of using the special flat car to bring the huge wing back to Middletown, Pa., for assembly.

Because of the delay in shipping the glass disk, the huge wing will probably have to be shipped by water via the Panama Canal, since it will be completed long before December 15.

Details of the new plane are guarded by the Army officials in Washington. Whether the new plane will be a large bombing plane to enter the Army's competition for such planes, or whether a new seaplane is planned, are questions which Army officials will not answer at present.

Because of the experience of the Douglas factory in building commercial land

transport planes, conjecture would indicate a bomber. The chord dimension of the new plane of 16 feet would bear out this supposition. The new Douglas transports have a chord of 14.1 feet.

The new clipper ships which the Martin Company recently built for the use of Pan-American Airways in their trans-Pacific flights, by contrast, have a chord dimension of 20.5 feet.

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Since the advent of commercial aviation, almost exactly 25 years ago, the major achievements in a popular sense, reports Mr. Warner, have been (1) the Navy's flight across the Atlantic Ocean in 1919; (2) the Army's round-the-world flight in 1924; (3) Lindbergh's solo flight to France and (4) Wiley Post's flight around the world "in barely more than the scriptural six days of labor."

The supreme developments which have made possible the feats of 1935 airplane transports must include, the aviation authority indicates: (1) the development of the supercharger to improve engine performance at high altitudes; (2) the evolution of an airway system of lighting adequate for night flying of passengers; (3) the improvement of the technique of radio navigation; and (4) the engine cowling, or cookiecutter-looking cover which shields aviation engines and makes possible a reduction of effective air resistance by almost one-third.

*Science News Letter, October 5, 1935*

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