# SCIENCE NEWS

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## THE NOBEL PRIZE AWARD IN CHEMISTRY



THE founders of the research laboratory of the General Electric Company had seen a new industry grow up around the fundamental scientific work of Faraday and others, and, men of vision that they were, they saw that they should not be content merely to apply the principles discovered by others, but should themselves support such fundamental research and so aid in the discovery of new principles for the further development of the art.

This led to the establishment by Dr. W. R. Whitney of a new type of industrial research laboratory, devoted largely to fundamental research. From the beginning Dr. Whitney insisted that each research worker should be free to publish his results in his own name so that each would be assured of such scientific recognition as his work merited.

The Nobel Prize award in chemistry to Dr. Irving Langmuir proves that important fundamental research can thrive in an industrial laboratory and that it is possible for a man connected with such a laboratory to receive the highest public recognition.

The scientific world is familiar with the many important contributions to science that Langmuir has made, and the general public, knowing of the major applications of the results of his researches, has clear evidence that fundamental research may be made to pay.

But only those in our laboratory can properly appreciate the value of another phase of Dr. Langmuir's work. While through his own researches he has been making large contributions to the growth of fundamental knowledge, he has been constantly helpful to others, not only in our own organization but also outside of it.

While most of his own efforts have been directed to fundamental research in physics and chemistry, he has always been interested in the application of scientific knowledge to human needs, and the same brilliancy in analysis, in reasoning and in scientific imagination which has enabled him to achieve so much in basic research, has always been applied generously and helpfully to the multifarious practical problems of his associates in the laboratory.

Langmuir's work shows that a man can serve science greatly and at the same time serve industry both by broadening the basis on which that industry rests and by the application of fundamental scientific methods to practical problems.

The Nobel award to Langmuir should be helpful to both science and industry. It should stimulate industry to seek for scientific workers of the highest ability and to support their efforts, and it should reassure scientific men that by accepting such support they are not precluding themselves from that recognition they most value, the recognition of merit in their work by fellow scientific men.—W. D. COOLIDGE.

## SURFACE CHEMISTRY



EVERY scientific research man, to reach the greatest achievement, must have a deep curiosity and an intense enthusiasm for discovering new important facts or new relations between known phenomena. During the course of his work he derives great pleasure from the progress he makes in these directions. His greatest satisfaction, however, is to see that his results are willingly used by others and is derived particularly from the recognition that his work receives from his fellow investigators.

My own work has been in the field of both chemistry and physics. I have been especially interested in the mechanism of chemical reactions which take place on solid surfaces.

At present I am engaged in working out the laws according to which atoms and molecules distribute themselves over surfaces forming single layers of atoms. These laws are of importance in understanding many simple phenomena such as those of lubrication and of the spreading of oil films on water.

The forces that hold atoms or molecules on the surfaces of solids or liquids are just as varied in their nature as those forces which determine the chemical and physical properties of substances in bulk. In other words, we must recognize that the chemistry and physics of surface phenomena are subjects almost as broad and as complex as the whole field of chemistry and physics. It has too often been thought that a single equation, such as a so-called "adsorption isotherm," could be devised to cover all surface phenomena.

The importance of this field of surface chemistry is really just beginning to be realized. There is much pioneer experimental and theoretical work to be done to establish even the fundamental principles which should guide investigations of these phenomena. What we need particularly is to study in great detail and with high accuracy a few typical simple examples of adsorption.

Dr. John Bradshaw Taylor and I are attempting to do this through an exhaustive study of the electrical and chemical properties of monatomic films produced on the surface of tungsten filaments when they are brought into contact with vapors of the alkali metal such as caesium or potassium. The effect of adding minute amounts of oxygen is of particular interest. Oxygen and caesium represent substances of two extreme types and so by working with surfaces that contain both kinds of atoms in varying proportions a very wide range of surface phenomena can be investigated.

The delicacy of the methods that can be evolved to detect caesium or oxygen atoms on surfaces is quite extraordinary. For example, it should be quite possible if desired to detect the presence of caesium atoms inside a vacuum bulb even if the average concentration of atoms in the space is only about one atom per cubic meter.

We intend to continue such investigations until we have obtained far more fundamental knowledge of surface phenomena than we have at present.

—IRVING LANGMUIR.

## THE PENETRATION OF CLOUDS AND FOG BY INFRA-RED RAYS

How photographic plates more sensitive than the human eye catch light waves, just a little too long to be visible to man, was told the Franklin Institute by Dr. Gilbert E. Doan, associate professor of physical metallurgy at Lehigh University.

Even though infra-red radiation does not affect the eye's retina to give the sensation of light, it penetrates clouds and fog which shut out visible light, Dr. Doan stated. So, he continued, when a sea captain wishes to take his bearings from the sun at noon on a cloudy day, when the sun is invisible, he points a reflector, somewhat like an automobile headlight, toward the zenith, and rotates it until in a certain direction the sensitive thermocouple inside the reflector gives a maximum reading. That is the direction of the sun and from this position and his charts he calculates the latitude and longitude of the ship.

The infra-red rays from the sun pass through the clouds and, after striking the reflector, are concentrated on a bismuth-silver thermocouple which registers a maximum on the attached galvanometer when the reflector is pointed directly at the sun. The instrument is said to be so sensitive that it will record the heat rays from a man's face a mile away.

This penetration of the infra-red rays through haze and clouds is now used also to photograph objects which are invisible to the eye. The city of Washington has been photographed from the air while covered with a blanket of fog and smoke so dense that the city was invisible to the aviator who took the picture. Mountains at a distance are frequently hidden by atmospheric haze, which produces what artists call "aerial perspective." Mount Shasta has been photographed from a distance of 331 miles. The aviator could not see it at all. Due to the fact that the earth's surface is curved, the view is interrupted about midway between the camera and the mountain.

By this method an aviator flying 20,000 feet over Dayton could easily photograph the city of Detroit. Such films are also used by astronomers in photographing stars and eclipses. Special Eastman films made sensitive to infra-red rays by the presence of a chemical called "cyanine" are used for this purpose. Since these rays are invisible, it is possible to take photographs in the dark, that is, in total darkness as far as the eye can see.

## PROTONS AND NEUTRONS

THE atomic building blocks of unit mass, known as protons and neutrons, may have electrical charges upon them that vary in magnitude from six times the famous "e" charge to no charge at all as in the case of the neutron. This is suggested by Dr. M. Delbruck, of the Wills Physical Laboratory of the University of Bristol, in a communication to *Nature*.

The charge "e" is that found negatively on the electron and the positive charge normally on the proton, or positive electron, is of the same magnitude but of the opposite or positive sign. Dr. Delbruck suggests that unit particles may have arbitrary, positive and negative values of charge which under the quantum theory may vary only by multiples of "e".

This new suggestion may explain, in Dr. Delbruck's opinion, the secondary radiations of high energy and ionizing power that cosmic rays produce when they smash into the atmosphere. These extremely vigorous radiations have been detected along the tracks of cosmic rays both in America and Europe. Dr. Delbruck considers them likely to be particles of mass one and charge between five and six times "e".

He believes that the highly charged unit particles may also explain the puzzling fact that cosmic ray particles are absorbed largely high in the earth's atmosphere. He visualizes unit cosmic rays as particles of mass one created in interstellar space with high positive charges. These do not collect electrons for compensating their charge until they enter the earthly atmosphere. There they pick up electrons and lose part of the charge. The ionizing or electrifying power thus decreases due to loss of charge, rather than because of reduction of number of particles as it is now assumed to be the case.

## FADING RADIO SIGNALS AND WEATHER FORECASTS

FADING of radio signals, so annoying to most broadcast listeners and especially to those specializing on long-distance receptions, promises to help meteorologists to make weather forecasts.

This is pointed out in *Nature*, by Professor R. C. Colwell, of the Department of Physics of West Virginia University. Forecasts made by this method during experiments ranging over four years were, he says, ninety per cent. correct.

Professor Colwell and Professor Ivo Ranzi, of the University of Camerino, Italy, have reached almost identical results, although their observation stations are situated in zones with quite different climatic conditions, and though Professor Ranzi's observations have been made with a 100-meter wave and Professor Colwell's with the 309-meter wave of KDKA, Pittsburgh.

Professor Colwell's reception point has been at Morgantown, West Virginia, sixty miles south of KDKA. He found that when a high-pressure area covered both Pittsburgh and Morgantown, the day signal from KDKA is stronger than the night signal, while the night signal is the stronger when a low-pressure area is present.

Both professors believe that these variations are due to changes that occur in what is known as the E stratum of the Kennelly-Heaviside layer in the upper atmosphere. During daylight radio waves are reflected from the E stratum, which is ionized by solar radiation. When, usually about the time of sunset, this ionization markedly decreases, the reflection starts to take place in the F stratum.

The advance of a depression from the north tends greatly to increase the ionic density in the E region,

from which, therefore, radio waves continue to be reflected after nightfall. When, however, an anticyclone prevails or depressions are located to the south, ionization of the E stratum rapidly lessens as the day proceeds, and reflection may start to take place in the F stratum in the afternoon.

The prolonged drought in his section of the country has forced Professor Colwell temporarily to discontinue his investigation, which can not readily be made when weather conditions remain persistently settled.

## PLEISTOCENE EAGLES

THE region about Los Angeles during the great Ice Age harbored eight species of large, eagle-like birds. To-day there are only two and those but rarely seen.

The Pleistocene eagles are represented by their remains found in the asphalt pits at Rancho La Brea, form the basis of a study recently completed by Dr. Hildegarde Howard, of the Los Angeles Museum. The collections of that museum include over thirteen thousand bones of eagles. The still existent golden eagle accounts for 9,500 of these bones, and the American or bald eagle for 1,750. The remaining 2,000 or more belong to species now extinct.

The extinct species were originally described by Dr. Loye Miller, of the University of California at Los Angeles, with the lower leg bone alone serving as the type specimen of each. It is only now that the other skeletal parts have been studied. In her recent work, Dr. Howard has made a careful study of all of the principal elements in an endeavor to reconstruct the complete skeleton of each species and thus facilitate the determination of the nature and relationships of the birds.

Four of the extinct species find their nearest relatives to-day in the Guiana harpy, the crested eagle and the urubitingas of Central America. The rarest and most bizarre of these possessed legs nearly equal in length to those of the little brown crane, though slightly stouter. Although one might suppose an eagle of this type to be related to the secretary bird of Africa, in reality it is closer to the long-legged urubitinga hawks.

Two other extinct species show relationship to the vultures of the Old World. One of these is so close as scarcely to be distinguished from the Egyptian vulture in certain of its skeletal elements. The other is remarkable in that though it appears to have been genetically related to the vultures, it exhibits the characters of well-developed beak and feet usually associated with the true eagles.

## ITEMS

AN elevation of almost a mile is reached on a new highway built in the Great Smoky National Park near Bryson City, North Carolina, by the North Carolina State Highway Commission. The exact height reached is 5,044 feet above sea-level, and engineers believe this to be the highest point on a state highway system east of the Rockies. It was pointed out that roads leading to the summits of Mount Mitchell and Mount Washington reach greater elevations, but these do not belong to state highway systems. The new road crosses the rugged Great Smoky area, most of which is above 4,000 feet with many peaks close to 6,500 feet. In spite of the broken character of the country a standard highway has been built on the greater part of which a speed of 45 miles per hour can be maintained in safety. Much additional road building is to be done in the park by the U. S. Bureau of Public Roads for the National Park Service. The Park Service estimates that in the near future more than 2,000,000 people will visit this area in cars each year. Yellowstone had only 400,000 visitors in 1931.

AMOR is the new companion of Eros, formerly most famous of the minor planets or asteroids. This name has been given to the planet discovered by E. Delporte at Uccle in March of last year. It won particular notice among astronomers when it was discovered that it approached the earth closer than Eros itself, which before held the record. Shortly after the discovery of Amor's close approach to the earth, another little planet, discovered by K. Reinmuth, approached even more closely to the earth. Amor also has the number 1221. The Berlin Rechen-Institut, which numbers the new planets discovered, has assigned permanent designations to fifteen new planets discovered between 1927 and 1932. Amor in mythology was identical with Eros.

LUTHER BURBANK has been granted his seventh posthumous plant patent by the U. S. Patent Office. The latest patent covers a new variety of cherry tree "characterized by its vigor of growth, the toughness of its wood, and the large size and absence of susceptibility of cracking and rot of its fruit." Burbank has so far been granted more patents through his executrix, Elizabeth Waters Burbank, than any other plant breeder. Five of his patents issued this year are for new varieties of plums and one for a yellow freestone peach. Three other plant patents have been issued recently, making a total of forty-three patents issued since the plant patent law was passed a little more than two years ago. Included in the new plant patents are a variety of barberry without spines; a new grape characterized by its early ripening, exceptionally large size, and superior quality of its fruit; and a freesia having a "long, pure white, gracefully tapering perianth and flat opening floral segments."

LICENSE plates will be much more legible in future if the advice of psychologists is followed in selecting the finish, colors and size and shape of letters. Only 28.9 per cent. of plates are visible at the distance you would expect to read them, it was found in the course of experiments conducted in the psychological laboratory of Iowa State College under the direction of Dr. Alvhh R. Lauer. The ideal plate should have a dull finish, Dr. Lauer concludes. Dark letters such as greens or blacks are best, and they should be printed on a light background. Bright yellow is very good for background. Difference in color is not so important, however, as difference in ability to reflect light. Numbers should be three times as high as they are wide and the space between them should be half as wide as the number itself.