version of ortho to para hydrogen takes place on a surface. Again, so far as we can now judge, we find agreement with experiment. The process seems to be one in which a hydrogen molecule is split into atoms by two surface carbon atoms which are abnormally far apart, each hydrogen atom becoming attached to a surface atom. These hydrogen atoms are now apt to leave the surface with a different but similarly situated hydrogen atom by the reverse of the absorption process. The conversion is thus completed. The result that for the greatest ease of activated adsorption the carbon atoms should be from four to five times as far apart as the normal distance between the hydrogen atoms is a rather striking part of this picture. This would be achieved in lattices in which some positions are vacant and we should therefore expect the instability to heat treatment customarily found with very active surfaces. Since a particular distance of surface atoms favors adsorption of a particular type of molecule, preferential adsorption is to be expected. These calculations indicate that the conception sometimes held, that an equal distance between surface atoms and the atoms in the gaseous molecule favors activated adsorption, should be abandoned.

With Dr. Kimball an examination was made of the proposed mechanism for the hydrogen chlorine reaction

$$Cl + H_2 + Cl_2 = 2HCl + Cl.$$

The calculations indicated it to be far slower than the reaction

$$Cl + H_2 = HCl + H$$

and so the first reaction could be excluded. This seems to be in keeping with the most recent experimental opinion. Similar although rougher calculations indicated that water should not be helpful in this reaction which apparently contradicted experimental findings at the time but is apparently at present in agreement with experimental findings.

In a paper appearing this month in the *Proceedings* of the National Academy it is pointed out that the difference in zero point energy for compounds of two isotopes makes the lighter isotope more reactive, and so should assist in their separation. Whether or not this is the principal factor in enabling Dr. E. W. Washburn to preferentially electrolyze away the lighter isotope from water remains to be seen.

We thus bring to a new problem a considerable confidence in the essential correctness of our method. It was with this background that we considered the additions of hydrogen and bromine to butadiene. The details of the calculations together with certain extensions will be published elsewhere as a joint paper with Mr. Albert Sherman and Dr. George E. Kimball. The addition of bromine may be expected to occur in either of two ways:

$$Br_2 + H_2C = CH - CH = CH_2 \rightarrow BrH_2C - CH = CH - CH_2Br$$
$$\rightarrow BrH_2C - CHBr - CH = CH_2.$$

Taking explicitly into account in both cases the six electrons which change partners in the first reaction and using simply the methods already outlined we find for the first reaction an activation energy of 36.4 kilo calories, for the second an activation energy of 52 kilo calories. It thus seems sufficiently clear why 1–4 addition is to be expected. The sort of thing which might cause 1–2 addition to be preferred of course is to substitute for a hydrogen on 4 some group that introduces large steric effects. We hope to return to this aspect of the problem in the not too distant future. If the same calculations are made for the substitution of hydrogen to butadiene the activation energy for 1–4 addition is found to be 77 kilo calories and for 1–2, 113. Emphasis is of course not to be placed on the exact value of our figures, but their relative correctness seems reliable. The size of the calculated activation energies indicates, certainly in the case of hydrogen, that any addition can only occur catalytically. In the case of the addition of bromine the indication is less clear cut that the reaction must go by way of surfaces, but it certainly should be examined from that point of view. The factors which favor 1–4 addition in the gas phase will of course be less important for catalyzed reactions.

The significant point again seems to be at least qualitative agreement between theory and experiment. Very much remains to be done in the way of examining more closely the underlying approximations of this method with the idea of obtaining more precise results; but apparently even in its present unfinished form we have a surprisingly powerful tool with which to attack the almost endless variety of problems of chemical mechanism. Something is also gained by having a scheme into which the multitudinous experimental results may be fitted.

OBITUARY

DR. WILLIAM ARNON HENRY

DR. WILLIAM ARNON HENRY, one of the outstanding pioneers in the development of agricultural instruction, research and extension in this country, died at his home in San Diego, California, on November 24, 1932, from an attack of pneumonia.

The life story of Dean Henry, as he was usually called, is one to inspire youth and is typically Ameri-

can. Born on a farm near Norwalk, Ohio, on June 16, 1850, he was still in his early teens when his father was called into the Union army. Heavy responsibilities then fell upon the boy, which undoubtedly aided much in developing the great capacity for work which later characterized him. After a period of study in Ohio Wesleyan University, he had to interrupt his course to earn money by teaching school. He then entered the course in agriculture at Cornell University and through supplementing the funds he had saved, by doing whatever work he could find, he completed his course in 1880 and received the B.S. degree.

Immediately after graduation he was selected to take the position of professor of botany and agriculture at the University of Wisconsin. The "and agriculture" part of his title meant little, for there was no agricultural college, no experiment station and not even a department of agriculture in the university. He was to take charge of the university farm, which was badly run down, and to endeavor to develop the agricultural work so it would serve the farmers of the state.

Henry's career furnishes an outstanding example of a man whose far-sighted vision and keen judgment led him to make a radical change from his first specialty. Though trained as a botanist and horticulturist, when he became acquainted with Wisconsin conditions, he became convinced that live-stock farming and especially dairying offered the most general possibilities for success. He therefore threw his great energy into the development of dairying and other phases of the live-stock industry. Not only was his work one of the important factors in the development which made Wisconsin the leading dairy state, but also he gained an international reputation as an authority on live-stock feeding. He was granted honorary doctor's degrees by the University of Illinois, the University of Vermont and Michigan Agricultural College in recognition of his accomplishments and his services to agriculture.

At first Henry had practically no funds for research and indeed all facilities were most meager. With his magnetic personality, he soon interested some of the legislators in his work and secured a modest appropriation for investigations on the ensilage of fodders and the manufacture of cane-sugar from sorghum cane. This is of especial interest because it was the first definite state appropriation for research at the university. Henry later delighted in telling how one of the legislative leaders leaned across the aisle when the appropriation was under discussion, and remarked to his boon companion, "Let's kill this pup before it gets to be a dog." Only because of Henry's inspirational zeal and enthusiasm was he able to convince the legislators that it was wise public policy for the state to support agricultural investigations.

The investigations begun under this appropriation were instrumental in convincing farmers of the value of silage in live-stock feeding and resulted in there being more silos in Wisconsin than in any other state. Not only did he develop the agricultural work at the university, but also he literally "stumped the state," preaching scientific agriculture to the farmers on every possibility and winning them by his personality and clearly stated facts. Undoubtedly it was Henry who first "sold" the agricultural college and the university as well to the people of the state. He focused attention on the possibilities of the university as a service agency for the whole citizenry, using every means at his command—lectures, bulletins, press articles and interviews.

In these early days very few students were enrolled in the regular university courses in agriculture. Therefore, in an endeavor to interest farm boys in agricultural instruction, there was begun in 1885 under Henry's direction the first agricultural short course in America. The idea of giving at a university practical instruction to students who were not graduates of a secondary school met with ridicule and scorn on the part of many educators, but the short course was exceedingly successful and a somewhat similar plan has been adopted in practically every state.

He saw at an early date that an accurate and simple test for the butter fat in milk was urgently needed by the dairy industry, and stimulated the late Dr. S. M. Babcock to undertake the investigations which led to the invention of the well-known Babcock test in 1890. The same year he started the first dairy course in America in which practical instruction was given in the testing and manufacture of dairy products.

Burdened with numerous and exacting administrative and teaching duties, nevertheless he found time for research on many problems in animal production which were both of practical and scientific importance. He was among the earliest to study the effect upon the growth and development of farm animals of rations ample and deficient in protein and in minerals; the value of silage for live stock; the effect of various methods of preparing feeds for swine, and the value and use of dairy by-products in stock feeding. In his writings and addresses he continually emphasized the importance of efficiency in farming and he was a firm advocate of cooperative effort among farmers. As an author, Henry's lasting fame rests on "Feeds and Feeding," which for thirty-four years has been the most widely used text and reference work on live-stock feeding in the English language and is now in the 19th edition.

Energetic to the extreme, he never spared himself, but gave every ounce of his strength to the upbuilding of the agriculture of his state. Due primarily to this, his health at last broke under the strain, and in 1907 he retired from his university duties.

Few know that Henry was to a considerable degree responsible for the passage of the parcel post bill in 1912. Convinced of the value of parcel post to farmers, Henry worked for months in advocating the legislation. Appreciating the value of concerted action, he wrote to the agricultural editors of the country and asked them to announce a "Parcel Post Day" on March 1, 1912. On this day, all who were in favor of parcel post were asked to write their congressmen personal letters. As a result, the lawmakers at Washington were fairly deluged with a mountain of mail from all the rural districts.

After his retirement Henry spent considerable time in Connecticut, developing a large fruit farm with his only son, Arnon T. Henry. Later he took much pleasure in collecting rare plants for his residence on the west coast of Florida, and for the last several years resided in San Diego, where he indulged his early interest in horticulture and botany.

FRANK B. MORRISON

CORNELL UNIVERSITY

RECENT DEATHS

EUGENE E. HASKELL, consulting hydraulic engineer, dean of the College of Civil Engineering at Cornell University from 1906 to 1921, when he retired with the title of professor emeritus, died on January 28, at the age of seventy-seven years.

PROFESSOR WILLIAM LISPENARD ROBB, head of the department of electrical engineering at Rensselaer Polytechnic Institute since 1902, died on January 26, at the age of seventy-one years.

DR. WILLIAM PHILLIPS GRAVES, professor of gynecology at Harvard Medical School since 1911, died on January 25, at the age of sixty-three years.

DR. VICTOR STERKI, assistant curator of zoology in the Carnegie Museum, Pittsburgh, died on January 25, at the age of eighty-six years. The Sterki collection of mollusca will be deposited in the museum.

SIR WILLIAM TAYLOR, president of the Royal Academy of Medicine in Ireland since 1927, died suddenly on January 29, at the age of seventy-two years. He was an honorary fellow of the American College of Surgeons and a past president of the Association of Surgeons of Great Britain and Ireland.

DR. MALCOLM EVAN MACGREGOR, in charge of the Wellcome Entomological Field Laboratories at Esher, Surrey, died on January 12, at the age of forty-three years.

PROFESSOR GUIDO TIZZONI, until four years ago professor of general pathology at the University of Bologna, has died.

THE death is announced of Dr. Albert Wigand, professor of meteorology at Freiburg, and of Dr. Karl Kreibich, professor of dermatology at the German University at Prague.

DR. HEINRICH MAHNKOPF died on December 20, 1932, aged forty years. He was a chief of division at the Prussian Geodetic Institute in Potsdam and Dozent at the Technische Hochschule in Berlin. Volume VI of the Publications of the International Latitude Service was recently completed and published under his direction. He succeeded Albrecht and Wanach in the work of the Latitude Service.

A CORRESPONDENT writes: "Miss Julia Irene Goodrich, known to many hundreds of biologists through the assistance she gave them in getting settled on their first arrival at Cold Spring Harbor, died January 21, at the age of fifty-seven years. Miss Goodrich was for twenty-seven years secretary to the director of what is now the department of genetics. She graduated from Smith College, showing especial proficiency in the classics and languages in general, like her uncle Chauncey Goodrich, who compiled a Chinese dictionary and translated the Bible into Chinese, and his son, L. C. Goodrich, lecturer in Chinese at Columbia University. Another uncle was professor of Latin at the University of Vermont. She was a member of the American Association for the Advancement of Science."

SCIENTIFIC EVENTS

CONFERENCE ON SPECTROSCOPY AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

THE Massachusetts Institute of Technology announces a Summer Conference in Spectroscopy in connection with its new Spectroscopy Laboratory. The arrangements are in charge of Professor George R. Harrison, and it is hoped that such a conference may become an annual summer event. On account of the air conditioning of the laboratory and the availability of summer cottages within commuting distance on the shore, this conference makes possible a combination of summer vacation with interesting scientific work under comfortable conditions.

The research facilities embrace five general subjects (1) quantitative measurement of spectrum in-