CHEMISTRY-PHYSICS

Nobel Researches Set Off Bursts of New Knowledge

Chadwick Discovered a New Building Block of Matter While the Joliots Made New Radioactive Elements

THE Nobel prize awards to Prof. F. Joliot and Mme. Irene Curie-Joliot, in chemistry, and to Dr. James Chadwick in physics recognize two of the most important achievements in physical science in recent years:

Discovery of the neutron, now considered one of the three ultimate particles of all matter in the universe—the achievement of Dr. James Chadwick, now of Liverpool University and at the time of his discovery in 1932 at Cavendish Laboratory in Cambridge, England.

Discovery of artificial radioactivity and manufacture of new radioactive elements —the achievement of the Joliots, Parisian husband-and-wife research team, early in 1934.

The award to Irene Curie, as she signs her research papers, marked the first case of child of a Nobel prize winner receiving the Nobel prize. For Mme. Joliot is the daughter of the late Pierre and Marie Curie, Nobelists jointly with Henri Becquerel in 1903 for their work on radioactivity. The mother of Irene Curie also received the Nobel prize in chemistry in 1911, thus becoming twice a Nobelist, still a unique achievement.

Modern Alchemy

The discovery of the neutron by Dr. Chadwick grew out of the modern alchemy of physics whereby transmutation is accomplished—not the sordid turning of lead into gold desired by the ancients, but more important to science, the turning of many light atoms into other elements in small but significant amounts. Lord Rutherford, Nobelist himself and head of Cavendish Laboratory, knocked "H" (chemical symbol for hydrogen) out of nitrogen in 1919. There was one light-weight element, beryllium, that resisted similar transmutation, and it was an attack on this metal that produced neutrons.

When bombarded with a stream of helium atomic hearts let loose by that radioactive cousin of radium called polonium, there was produced from beryllium a stream of powerful radiation. The Joliots in Paris and two Germans, Bothe and Becker, thought that it was the well-known gamma radiation so useful in cancer treatment, but Dr. Chadwick recognized it as a stream of electrically neutral particles which had already been suspected from theory and had even been named "neutrons" before discovery.

Because of its electrical neutrality, the neutron has the ability to plunge itself into places that can not be reached by other atomic particles. It was immediately seized upon as a very welcome tool for prying open the atom. Used by investigators in America and elsewhere, it opened up a new bonanza of atomic knowledge.

World-Acclaimed

Two years later the achievement of artificial radioactivity by the Joliots was world-acclaimed. The persistence and unchanging nature of natural radioactivity has perplexed scientists. Try as they will, they cannot speed, slow or otherwise change by an iota the constant natural disintegration of radium or any other radioactive substance.

Man-caused radioactivity was first produced in aluminum, familiar metal. A stream of helium atom hearts was flung at a thin foil of this metal. Out came first neutrons, and then a stream of positrons, another atomic particle discovered in 1932 by Dr. Carl D. Anderson, California Institute or Technology. What was unusual and important is that the positrons were flung off for many minutes after the bombardment stopped. The atom was disintegrated not like an explosive shell but like an incendiary bomb.

Here was radioactivity made to order. There was great activity in laboratories as atomic particles of various kinds were flung by high-voltage current at various substances. A large number of substances were transmuted into new radio-elements that lived for minutes, hours or a few days and then blew themselves up with release of powerful radiations.

There was hope aroused that these new radio-elements would be of medical and industrial importance. Today it is known that plans are under way in one laboratory at the University of California to produce radiosodium in quantity in the hope that eventually it can be used in the treatment of disease through its injection into the blood streams of the patients.

The chemistry prize awarded the Joliots is for this year and the physics prize to Dr. Chadwick is the 1935 prize. The 1934 physics prize, not awarded last year, will not be awarded at all but will be added to the Nobel fund for future prizes.

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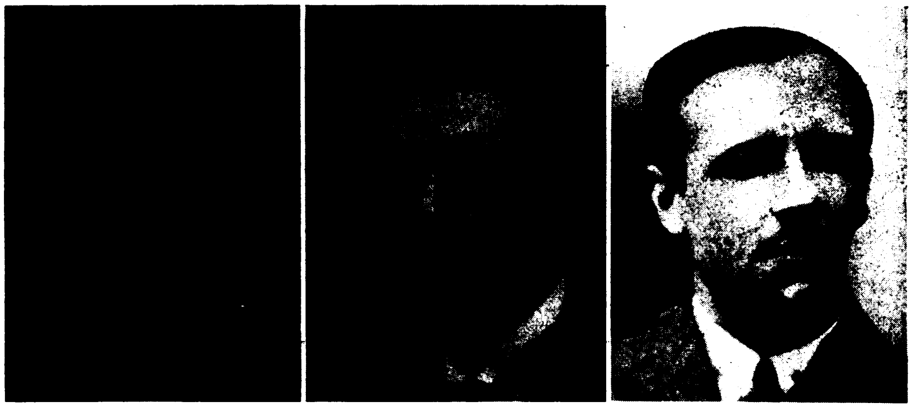

AWARDED NOBEL PRIZE

The Joliots, husband and wife, and (right) Dr. James Chadwick.

BACTERIOLOGY

No "Germs" at Altitudes Of 20,000 Feet and Over

THE AIR at altitudes of 20,000 feet and up to 28,000 feet is apparently free from "germs" or what bacteriologists call sterile, Dr. George Walker of Baltimore reports. (*Science,* Nov. 8.)

Although his right index finger was

frostbitten and both hands "suffered severely from the cold" while he was making his observations, Dr. Walker was not satisfied with his technic and states that the work was not done "with sufficient accuracy to claim the establishment of any new facts."

He did establish a record, however, for the highest altitude at which such tests had ever been made. The previous record for high altitude "germ" searches was 20,600 feet, established by Prof. B. E. Proctor of Massachusetts Institute of Technology. Others who have examined the upper air for the presence of disease germs or of fungi are F. C. Meier of the U. S. Department of Agriculture and Col. Charles A. Lindbergh who assisted Mr. Meier by exposing plates to catch possible fungus spores in a recent flight over land and water.

Dr. Walker made his flight in a new U. S. Army bombing plane. The doctor sat in the compartment provided for the machine gunner at the farthest forward point of the plane. There was a slit in the front through which he could extend his hands.

At 20,000 feet, and at every 1,000 feet above to 28,000, Dr. Walker held his hands through this slit to open a sterile flat glass dish containing solidified material on which "germs" grow. In spite of the intense cold—34 degrees below zero Fahrenheit—and wind that rushed past at a velocity of 150 miles an hour, he managed to hold the dishes open for half a minute. The dishes or plates were then brought back to his laboratory and incubated. On only two of twelve plates were there any microorganisms and these, Dr. Walker is sure, were contaminated by organisms on his hands or clothing.

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INDUSTRIAL RESEARCH

Textile Research Pays Million Dollars Annually

DRAMATIC answer to the oft-mentional question "Does fundamental research in industry pay?" was offered at the dinner of the U. S. Institute for Textile Research.

The estimated financial return from research investment of a few hundred thousand dollars spread over five years' time is $1,000,000 a year.

Even if the $1,000,000 saving was gained but once, the research would be good business; but the saving would be an annual one, if textile mills utilized generally the research results obtained.

Dr. E. R. Schwarz, associate professor of textile research at the Massachusetts Institute of Technology, headed the symposium which revealed the "$1,000,000-a-year" textile research. Toastmaster at the dinner was Francis P. Garvan, president of the Textile Institute and president of the Chemical Foundation.

One new textile aid, C. L. Pattee of Salem, Mass., revealed, is the use of microscopes for studying the weakness and dyeing qualities of cotton fibers.

Shine polarized light on a cotton fiber, examine it with an inexpensive low-power microscope, and the mature and immature fibers stand out from one another. Mature fibers bring strength into the cotton threads into which they are made; immature fibers are weak and will not take dyes well or uniformly.

Formerly workmen known as cotton classers went through each bale of cotton and tried—with only partial success—to recognize and sort the young from the old cotton. Considerable wastage in the form of weak yarn and poor dyeing resulted.

With the easily-learned microscope-polarized-light technique, an unskilled operator now excels the most skilled cotton classers.

Study of the size of silk fibers has removed one bugbear from silk fabrics manufacturers — two-toned dyeing — where adjacent sections of the fabric come out of the dye vats in different hues, although the same dye was used.

F. A. Mennerich, of Hoboken, N. J., disclosed that a difference in silk fiber size amounting to but three hundredths of an inch in diameter ratio was sufficient to cause the two-tone dyeing.

Flatter and larger silk filaments dye darker than the rounder and smaller filaments. Previously it had been supposed that conditions of soaking, dyeing and boiling-off the dye were the basic causes of the trouble.

The size of the silk filament is not especially important in determining a shade of silk stockings, for example. What is needed is uniformity of size within the .03 inch diameter limits.

The new technique is to grade various bales of silk as to filament size and then see that no two consecutive bales have silk filaments varying by more than the known limits. This practice is found to eliminate two-tone dyeing from about two-thirds of all lots of silk without further help.

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PHYSIOLOGY—METEOROLOGY

Forest Service Lookout Tells How Lightning Feels

U. S. FOREST Service men certainly can "take it": one of them was struck by lightning not long ago, and lives to tell the tale.

Al Moore was on lookout duty on top of a hundred-foot steel tower, set high on Quartz Ridge, in the Nezperce National Forest. A black storm rolled up. His steel perch was a challenge to the thunderbolts, bolder even than Ajax. And the lightning did not ignore the challenge. It hit that tower, Al Moore and all, a first-class stroke.

Said Lookout Moore afterwards: "My first impression was a blinding flash, but I was not aware of any crash or noise. A hit like that leaves a man with a very limp, weak feeling, soon followed by a cold sweat and an empty sensation in the pit of his stomach."

And with professional coolness he commented, "There is some satisfaction in knowing that the tower can take a direct hit and the lookout live through it."

Even without a direct hit, a steel lookout tower is an interesting place during lightning weather, as Mr. Moore describes it: "The tower always buzzes and hums as a storm approaches, and small balls of blue flame hang to each corner of the cabin roof . . . . It's good business to wear rubber-soled shoes, and to keep hands off sides of the cabin and other metal parts."

At that, for all his steadiness and nerve, Mr. Moore admitted that for days after the experience the mere recollection of it would "raise goose-pimples" all over him.

A steel tower 100 feet tall, rising high above any treetop or rock in its immediate vicinity, is a target for lightning hardly to be improved upon. That a Forest Service man stays in it, storm or no storm, watching for the first pencil of smoke a lightning-set forest fire may send up, miles away, even after the literally hair-raising experience of Lookout More went through, is surely testimony to the nerve and loyalty to the job to be found in the Service.

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