

SCIENCE NEWS

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THE PERKIN MEDAL OF THE AMERICAN SOCIETY OF CHEMICAL INDUSTRY

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DR. C. M. A. STINE, vice-president in charge of research of E. I. du Pont de Nemours and Company, of Wilmington, Del., the chemist who initiated the research of making big molecules out of little ones that led to the discovery of nylon, the remarkable organic material out of which chemistry can make anything from sheer silk-like stockings to toothbrush bristles and fishline leaders, was presented, on January 12, with the Perkin Medal of the American Section of the Society of Chemical Industry.

In his address following the presentation, Dr. Stine traced the rise of America's great organic chemical industry of to-day from its virtual birth at the time of the World War in 1914.

Directly or indirectly from the results of intensive research in organic chemicals have come the following advances: Modern plastics, motion picture film using synthetic camphor, medicinal chemicals like sulfanilamide and sulfapyridine, superior dyes, improved cheap and safe refrigerant fluids like Freon, a vast improvement in the wear of automobile tires, the development of synthetic rubber, safety glass, tougher and more oily oils and lubricants for motor cars, superior gasolines and fuels, better and safer explosives, synthetic urea for fertilizer for agriculture and the new plant hormones and vitamins.

Dr. Stine stated that contrary to popular belief, American chemical industry was large prior to the war, but mainly in the inorganic chemical field. As early as 1865 its products had a valuation of some \$60,000,000. In 1910 the United States produced three times as much sulfuric acid as Germany and twice the amount of alkalis made in England.

In organic chemicals, however, the United States was sadly lacking at the start of the war. The great industry which has been created since that time, in this field, represents an enormous investment of American money and American brains in research. Dr. Stine pointed out that in the case of the du Pont concern alone, \$40,000,000 was invested in research before a cent of profit was realized.

Dr. Stine challenged those who maintain that present national and international ills are the result of too much scientific development. These people overlook, he said, "the horrible wars that have been waged all down the years when there was no science as we know it to-day. They overlook or wilfully ignore the well-recognized fact that the lust for power by one man, or a small group of men, leads all too frequently to that great social and economic disaster called war. Until indoctrinated race antipathies and hatreds, envy and greed for power are eliminated from human nature through spiritual regeneration, we shall have no solution of this fatal disease which afflicts humanity. Science, though it is able to confer the richest blessings upon mankind, is not able to change the heart of man and insure that the great increases in scientific knowledge will be beneficently applied. But

while this is unquestionably true, I nevertheless hold that the great contribution which the development of the organic chemical industry has made to the self-sufficiency of this country is a definite contribution toward the maintenance of peace."

THE MESON PARTICLES OF COSMIC RAYS

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A NEW kind of atomic particle that would make "triplets" out of the "twin" meson particles found in cosmic rays is suggested by Professor Hans A. Bethe, of Cornell University, who worked out the theory of how the sun keeps shining.

Professor Bethe has been applying his skill in mathematical physics to calculations on how meson particles—having 200 times the mass of ordinary charges of electricity, the electrons—can be used to explain nuclear forces. These attractive forces within the nucleus help hold all atoms, and hence all matter, together and form a sort of "cement" that binds together the atomic building blocks of the physical world.

That meson particles might exist and have the rôle of transferring energy between nuclear particles was first suggested in 1935 by the young Japanese physicist Yukawa. This was before the particles were actually found in cosmic radiation.

Professor Bethe's calculations show that for an atom to liberate a meson particle would require from 80,000,000 to 100,000,000 electron volts of energy. This is far beyond any energies yet available in the laboratory through bombardment by giant machines for smashing the atom.

The new triplet kind of meson, yet unfound but needed to explain more fully nuclear forces, would be without an electrical charge, according to Professor Bethe. Mesons with positive and negative electrical charges—the twins—are already known to exist.

SYNTHETIC HORMONES

LEAVES, roots and other parts of a plant live under a democratic régime, as contrasted with the totalitarian state of an animal's body, wherein all parts are kept in strict subjugation and control by the central nervous system. This contrast was presented by Professor F. W. Went, of the California Institute of Technology, at Lehigh University, in a lecture on January 15 under the auspices of the Society of the Sigma Xi.

Although an all-powerful central control is lacking in plants, they do not live in a state of anarchy, Professor Went pointed out. The democratic system of checks and balances, the pride of American constitutional development, is paralleled in plants by a system of internal secretions or hormones, whereby growth and other processes in one part are stimulated yet kept in control from other parts of the plant body. Thus, the auxins that promote root growth are manufactured in the tips of the growing shoots. Mature leaves make hormones that influence the growth of younger leaves, and also other hormones that determine the formation and blossoming of flowers.

It has been possible to isolate and analyze a few plant hormones and by testing similar synthetic compounds of increasing chemical complexity it has been learned what molecular groupings are effective in stimulating plant life processes. Professor Went likened this process to a close mechanical analysis of a key, to determine just which wards tumble given pins in a lock.

This analysis of plant hormones has made possible the artificial synthesis of growth-promoting substances like the now famous indole acetic acid, which enable man to control growth processes to his own liking and advantage instead of letting plants grow in their own naturally proportioned, internally controlled way. Thus far only a beginning has been made, in such relatively simple operations as inducing root formation on otherwise obstinately non-rooting cuttings, spraying trees to prevent abnormal dropping of immature fruits, and so on. But the possibilities for future development along this line appear to be practically without limit.

THE BUHL PLANETARIUM

By patiently running the Buhl Planetarium machine back through 5,200 years of sky history, until it flashed on the ceiling the star-picture seen by Egyptians the night of June 18, 3251 B.C., Dr. Jotham Johnson, the University of Pittsburgh archeologist, claims that he has found the exact date when Egypt's famous calendar started.

Egyptians had no Leap Year provision, which explains why their calendar got out of step with the sun, and which also has given historians a clue to the date when their 365-day calendar must have been invented. "Lacking a Leap Year, the Egyptian calendar fell back one day every four years," explains Dr. Johnson. "And in 1,456 years, their calendar slipped back an entire year. That 1,456 years of slipping back is called the Sothic Cycle. We know, by authenticated written records, that a Sothic Cycle ended in 139 A.D."

Counting back, historians have speculated that the Egyptian calendar might have started 4229 B.C. or 2773 B.C. Dr. Johnson considered one of these dates too early, because Egypt was too primitive then, and the other date too late in Egypt's civilization. He pinned his theory to 3251 B.C. and seized an opportunity to check it when the Buhl Planetarium machine could be run backward for ten hours to reach such ancient sky patterns.

Historians, he says, are certain that Egyptians started their calendar when Sirius, the Dog Star, brightest star in the sky, appeared over the eastern horizon just before the sun came up. The natural time of year for the Egyptians to start their calendar, he adds, was when the Nile flood began, soon after the middle of June. Dr. Johnson sought, therefore, for Sirius to appear just before dawn in the mid-June sky picture of 3251 B.C., and to his delight the planetarium confirmed his theory.

Additional evidence for his theory, he reports, is finding that a thin new moon appeared that night in the west just after sunset. Since the earlier Egyptian calendar had been a primitive one based on the moon, it would be natural, he explains, for them to want to change smoothly to a sun calendar, and this would mean choosing some night when a new-moon month was beginning.

ELECTRIC SHOCK TREATMENT FOR MENTAL PATIENTS

USE of electric shock treatment for mentally sick patients is announced by Dr. Lothar Kalinowsky, of Rome, in a report to *Lancet*.

The treatment is like the now widely used insulin and metrazol shock treatments. Instead of injecting either of these shock-inducing drugs, an electric current is passed through the patient's head to induce the fits, or convulsions, which restore the patient to sanity, for a time at least. Treatment is said to be much easier on the patient, and also on the nurses and attendants, than the metrazol or cardiazol shock treatments. Nor is there any danger from the amount of current used to induce the fits.

Dr. Kalinowsky states that "Several thousand fits have been produced on some hundred patients, partly treated in the Rome clinic and partly reported from other institutions, without any accident whatever." The number of patients treated is still too small and the time since treatment is too short to allow definite conclusions as to the curative value of this method. According to information given by several institutions it can only be said that the number of recovered and improved cases of schizophrenia corresponds at least to that of the remissions of cases which, in the same clinics, were treated with cardiazol (metrazol).

All the disagreeable sensations patients complain of with metrazol treatment are said to be missing with the electric shock method. The patient always loses consciousness and awakens slowly, with no memory of the experience. No fractures, dislocations or ruptured muscles have been seen, though Dr. Kalinowsky admits that they could occur.

Electrodes are put on both sides of the patient's forehead, animal studies having shown that the temples are the best place for the treatment. Currents of 70 to 110 volts and 300 to 600 milliamperes are generally needed to produce fits. The shock is given for one tenth of a second.

REFLECTION FROM THE EYES OF ANIMALS

ANIMAL'S eyes don't shine in the dark; they must have at least a little light to produce that often startling gleam, for they shine only by reflected light. Such are the indications of a study made on hundreds of specimens in the National Zoological Park in Washington by Ernest P. Walker, assistant director, and reported in the new year-book of the Smithsonian Institution.

Eyes of different species reflect light in widely differing ways. The eyes of alligators and crocodiles "give one the impression that he is looking into a brilliantly glowing pinkish opening in a dull-surfaced bed of coal." Some smaller rodents have eyes that shine "like an illuminated piece of amber."

Apes' and monkeys' eyes do not reflect light at all, Mr. Walker found, and he got only a faint reflection from the eyes of the ring-tailed lemur, one of the more primitive members of the ape-monkey family, the primates. Studies by other investigators have shown that only the rarest exceptions among human eyes have reflecting power.

In making his studies, Mr. Walker went about the Zoo

at night, with a small flashlight lamp in a reflector on his forehead, using a three-cell battery in his pocket as current source. He tried varying the color of his light, but obtained nothing particularly striking in this way.

Previous studies on the eyes of animals at night have been conducted only in the field, so that it has not always been certain what animals were seen, and it has never been possible to go back and check up a second time on the same individual. By working in the Zoological Park Mr. Walker has been able to obtain more numerous and more carefully verified records.

SAFETY FUELS FOR AIRPLANES

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A NEW type of safety gasoline for aviation that would be more volatile than kerosene and hence less hazardous from the explosion standpoint, was described at the meeting in Detroit of the Society of Automotive Engineers by Robert E. Ellis and William J. Sweeney, of the Standard Oil Development Company.

Back in the days when the U. S. Navy had the *Akron*, *Macon* and other great airships, safety fuels were seriously considered. These airships were inflated with helium to decrease their fire risk and a gasoline was sought which would vaporize only a little and could be used to cut the kill hazard from fuel still further.

The disasters to Naval airships and the urge for superior high-octane gasolines for airplanes were twin reasons why interest in safety fuels diminished after 1932, although in that year the capacity for the production of such safety fuels reached tank car lots. New advances in petroleum refining since 1932 have, however, made it possible to produce safety fuels with very high octane (anti-knock) rating up to 100 octane number. These safety fuels have a flash point, the temperature at which their vapors will ignite, of 100 degrees Fahrenheit. In contrast, the flash point of many gasolines is below room temperature and, in some cases, is as low as minus 30 degrees Fahrenheit.

In their analysis of crude petroleum sources suitable for making safety gasolines, Messrs. Ellis and Sweeney find that if the proper equipment were installed, a production of 10,000,000 barrels of such fuels could be produced each year, an amount sufficient for the needs of aviation for many years to come.

Stopping point for the immediate introduction of these new safety gasolines is that they can not be burned in an ordinary type of engine using a carburetor. It is necessary to supply the fuel to the engine by injection methods.

ITEMS

INFLUENZA is continuing its disturbing rise, suggestive of a coming epidemic, according to reports made to the U. S. Public Health Service. For the week ending January 6, the latest on which reports are available for the entire nation, there were 9,630 cases. This is an increase of more than 2,500 cases during the week. South Carolina, North Carolina and Georgia were particularly hard hit, South Carolina reporting 3,154 of the nation's total number of 'flu cases.

WIDE-SPREAD rain over most of the Ohio Valley, with

mostly non-freezing temperatures, is expected to wash away a great part of the snow that now blankets the region, and may give that river a start toward one of its winter floods. The crucial hours will come when colder weather moves in from the northwest. If the new low temperatures come soon enough and are sharp enough, the partly melted snow will be stopped on thousands of hillsides before it has a chance to slip into the creeks and thence into the larger streams.

THE USSR is now the world's third cotton-producing country, with 600,000 bales out of last year's world total of 3,250,000, and ranking just behind the United States and India, according to the German journal, *Die Umschau*. Russia's new and vast cotton plantations are in southern Siberia, south of the line between the Caspian Sea and Lake Balkhash. Railways are available for bringing the crop into European Russia.

HEMP without marihuana is sought by plant breeders of the U. S. Department of Agriculture as basis for a new all-American cordage industry. New grasses to hold soil against rising up into dust-storm clouds are another goal of government research. So also are early, hardy tomatoes suitable for cultivation in the Great Plains area. These are samples of the practical researches reported in the recently issued annual report of the chief of the Bureau of Plant Industry to Secretary Wallace. More than a hundred scientific investigation projects are discussed.

THE belief that onions will check the growth of food-spoiling germs, especially in pickles and relishes, got scientific confirmation and esthetic condemnation in research was reported by Professor James E. Fuller, of the Massachusetts State College, Amherst, at the recent meeting of the Society of American Bacteriologists. Onion juice sterilized by filtration (not by heat) can prevent the growth of certain bacteria that commonly contaminate food, including food-poisoning bacteria. However, the required concentration of juice is so great that its sterilizing value is of little, if any, practical value.

SYNTHETIC vitamin E—so-called reproductive vitamin because it aids fertility in rats—is entering clinical tests on human beings, according to Professor Lee Irvin Smith, of the University of Minnesota, who synthesized it. "It would be quite premature to say that vitamin E is a cure for any kind of sterility," Professor Smith said. Definite statements regarding vitamin E therapy must await extensive clinical results. "The clinical side of vitamin E research has just begun. With a plentiful supply of the synthetic vitamin available, representing a standard preparation of known and uniform potency, it is to be hoped that the clinical work will proceed rapidly so that the usefulness, as well as the limits, of vitamin E therapy may soon be known. It must be remembered that most of the biological data in connection with vitamin E have been obtained by using rats as test animals, and statements regarding what the vitamin will do in the treatment of human diseases or diseases of animals other than rats, are founded on very few examples plus the assumption that other animals will respond as rats do."