neurology and neuro-psychiatry. The lecture was the ninety-first anniversary discourse of the New York Academy of Medicine.

DR. CECIL K. DRINKER, professor of physiology in the School of Public Health of Harvard University, will deliver the third Harvey Society lecture of the current series at the New York Academy of Medicine on December 16. Dr. Drinker will speak on "The Functional Significance of the Lymphatic System."

DR. ISAIAH BOWMAN, president of the Johns Hopkins University, will deliver the inaugural address at the installation of Dr. Oliver C. Carmichael on February 3, 1938, as chancellor of Vanderbilt University.

PROFESSOR STEPHEN TIMOSHENKO, of Stanford University, will lecture at the Iowa State College on December 13 on "Recent Research Work in European Material Testing Laboratories," at a meeting of the local chapter of Sigma Xi. He will speak also under the auspices of the Graduate College on "Impact Effect on Bridges."

THE new laboratory near Lansing of the Michigan State Department of Health, which was built at a cost of $250,000, was dedicated on November 12. Dr. Frederick G. Novy, dean emeritus of the medical school of the university, who assisted in establishing the first public health laboratory of the state in 1887, gave the address at a banquet given under the auspices of the Michigan branch of the Society of American Bacteriologists and directors of registered laboratories.

A CONFERENCE to collate the results of researches in the combustion and economy of anthracite together with experience in its production, preparation, distribution and utilization will be held on April 29 and 30 at Lehigh University. Reports on some of the non-fuel uses of anthracite will also be included in the program. The conference, which is expected to bring together authorities in the field, has been assured the support and cooperation of leaders in the anthracite industry. Professor Howard Eckfeldt, head of the department of mining, and Allen Johnson, research engineer, are in charge of arrangements for the conference.

THE *Journal* of the American Medical Association reports that the California Medical Association has prepared a program of graduate education to be delivered throughout the state over a five-year period. The conferences will be clinical and not didactic. The University of California, Stanford University, the University of Southern California and the College of Medical Evangelists will cooperate with the state medical association by making available members of the faculties as instructors for these conferences. The California Tuberculosis Association, the California Heart Association and the Los Angeles County Clinical Statistical Association, on request, will recommend members of their organizations for teaching tuberculosis and heart disease. In addition to the specialties, the courses will cover abdominal disease, diseases of metabolism, genito-urinary and venereal infections, diseases of the central nervous system, laboratory equipment and technique, drugs, vaccines and serum.

UNDER the terms of the will of Mrs. John V. Hansen more than $250,000 will ultimately become the property of Lehigh University. The will directs that on the death of Mr. Hansen the principal be turned over to Lehigh University as a scholarship fund in memory of her father, the late James Clark Haydon, coal mine owner of Hazleton, Pa.

THE new state cancer hospital authorized by the 1937 legislature of Missouri will be constructed in Columbia, conditional on the city donating a 40-acre site, which already has been tendered to the state without cost. Construction work will be started next spring, as soon as weather conditions permit. It is estimated that about 18 months will be required to complete the hospital. The legislature appropriated $400,000 for construction of buildings, $100,000 for equipment and $100,000 for maintenance for one year.

GUY'S HOSPITAL, London, has received a gift of £43,000 from "Five Friends" for the provision of a psychiatric clinic. The clinic will deal with minor mental illnesses and with major mental illnesses which are not certifiable. The new building will be erected within the grounds of the hospital and will provide forty-two beds for patients of moderate means, in addition to the six beds which are already provided by the hospital for psychiatric cases. The clinic will be the first of the kind in Great Britain to be associated with a general teaching hospital and will provide opportunities for investigation which can not be obtained in any other way.

DISCUSSION

CRYSTALLIZED VITAMIN C AND HEXURONIC ACID

THE well-merited award to Albert von Szent-Györgyi of the 1937 Nobel Prize in Physiology and Medicine "for his discovery of the biological processes of oxidation with special regard to vitamin C and the fumaric acid catalyses" is erroneously interpreted in many quarters solely as an award for the identification of vitamin C. Reports on crystalline vitamin C are sufficiently clear that no such interpretation should

be made, but numerous careless or erroneous statements have appeared in scientific journals, reviews and books and in lay publications, which tend to obscure the priority of Dr. C. G. King and W. A. Waugh, of the University of Pittsburgh, in establishing the identity of vitamin C with a pure crystalline substance.

In 1927 Szent-Györgyi[1] made the first statement concerning a reducing substance which he had not yet isolated in crystalline form. He designated it C_{XII}, an apparently fortuitous use of the letter "C" and with no implication that it was related to vitamin C.

Again in 1927 Szent-Györgyi stated:[2]

To exclude any anticipation of function and chemical structure, the substance giving this reduction was named by its protocoll number "C_{XII}" being the twelfth substance prepared and examined in my work on tissue oxidation and the function of the adrenal cortex. Having been enabled to resume this work at the Biochemical Laboratory, Cambridge, the substance has been further investigated and finally isolated in crystals, which on recrystallization showed a constant melting point.

And

Preliminary experiments tend to show that the substance is not devoid of biological activity. My earlier experiments, showing that C_{XII} is not the hormone of the adrenal cortex, seem in the light of Banting's and Rogoff and Stewart's recent work to be inadequate. Analysis of the biological significance and chemical constitution has been started.

Zilva[3] on May 7, 1932, wrote:

Ever since Prof. A. Szent-Györgyi suggested the possible identity of hexuronic acid[4] with the "reducing principle" present in all active antiscorbutic solutions . . .

The paper[4] to which Zilva refers contains the following sole reference to vitamin C:

The reducing properties of plant juice have repeatedly attracted attention, especially from students of vitamin C. Bezssonoff has applied Folin's phosphomolybdic acid reagent. The reducing substances of lemon juice have been made the object of a thorough study by Zilva, who established interesting relations between vitamin C and the reducing properties of the plant juice. The main reagent employed by Zilva was phenolindophenol. Indophenol blue is readily reduced by the hexuronic acid, so that it is probable that it was this substance which has been studied by Zilva.

The title of Zilva's paper[5] (received for publication on August 25, 1932), "The Non-Specificity of the Phenolindophenol Reducing Capacity of Lemon Juice and Its Fractions as a Measure of Their Antiscorbutic Activity," succinctly reveals that Zilva did not believe that the reducing substance with which he had dealt in a series of investigations was identical with vitamin C but a substance associated with it. Since Szent-Györgyi, as quoted above, believed "that it is probable that it was this substance which was studied by Zilva," then hexuronic acid was identified by Szent-Györgyi in 1928 with a substance associated with vitamin C but not vitamin C itself.

Tillmans, Hirsch and Hirsch[6] in January, 1932, stated (in a note added at proofreading) in regard to Szent-Györgyi's 1928 paper:

Die Frage der etwaigen Übereinstimmung dieser Substanz [hexuronic acid] mit dem vitamin C wird von Szent-Györgyi nicht aufgeworfen. Er ist vielmehr der Ansicht, dasz dieser Stoff in der Oxidationsmechanismus des Peroxydase-Systems eingeschaltet ist.

This note expresses an independent opinion that Szent-Györgyi did not consider hexuronic acid to be vitamin C.

McKinnis and King[7] in 1930 established the acidic nature of vitamin C, and in discussing the acidity said:

It is also of interest in relation to the close association of vitamin C with the actively reducing uronic acid isolated by Szent-Györgyi.[4]

That the idea was current among King's students that vitamin C was a uronic acid is further evidenced by the statement in 1931 by Smith and King.[8]

In view of the fact that the active preparations were always characterized by a high content of strongly reducing substances and acidic material analogous to the "hexuronic acid" isolated by Szent-Györgyi, it was thought desirable to find out whether the use of a strongly reducing, weak acid, such as formic, would prove advantageous in protecting the concentrates.

In a review of the work on vitamin C during 1932, Harris[9] contributes a parenthetical statement of significance:

Early in 1932 Szent-Györgyi, in collaboration with Svirbely (who, it may be recalled, had lately been associated with King in work on vitamin C concentration at the University of Pittsburgh), announced . . .

On April 1, 1932, as the culmination of a series of studies concerned directly with vitamin C, King and Waugh[10] announced the isolation of vitamin C in crystalline form. They said:

1 *Biochem. Zeits.*, 181: 433, 1927.
2 *Nature*, 119: 782, 1927.
3 *Nature*, 129: 690, 1932.
4 *Biochem. Jour.*, 22: 1387, 1928.
5 *Biochem. Jour.*, 26: 1625, 1932.
6 *Zeits. Untersuch. Lebensm.*, 63: 1, 1932.
7 *Jour. Biol. Chem.*, 87: 615, 1930.
8 *Jour. Biol. Chem.*, 94: 491, 1931.
9 *Ann. Rev. of Biochem.*, 2: 264, 1933.
10 SCIENCE, 75: 357, 1932.

The recrystallized substance corresponds in chemical and physical properties to a hexuronic acid, and is apparently identical with the hexuronic acid described by Szent-Györgyi and reported as a reducing factor in adrenal cortex, cabbage and other sources. Feeding approximately 0.5 mg. daily protects growing guinea pigs from scurvy and permits normal vitality in the animals when on a vitamin C free diet. A detailed account of the experimental work will be published in the near future, but this involves only a few steps beyond the work previously published.

On April 16, 1932, Svirbely and Szent-Györgyi[11] announced that they had, by means of 1 mg of hexuronic acid daily, protected guinea pigs from scurvy in an experiment lasting 56 days. Because of the unavailability of milk powder for making the basal diet this test was unfortunately marred by loss of weight of all animals. A current experiment with a satisfactory diet was in progress, and three animals which had received 1 mg of hexuronic acid for 55 days were found to be free of scurvy. However, it was not until May 7, 1932, that Svirbely and Szent-Györgyi[12] stated that hexuronic acid is vitamin C. They said:

> This allows us to conclude that vitamin C is a single substance and identical with hexuronic acid.

Simultaneously with our previous note, C. G. King and W. A. Waugh[10] reported that they have obtained, from lemon juice, crystals which showed antiscorbutic activity and were apparently similar in chemical and physical properties to hexuronic acid. The duration of the test period was not stated, and apparently no chemical analysis was made. Until this is done, the nature of their product remains in doubt.

The results of Waugh and King[13] and those of Svirbely and Szent-Györgyi[14] were published in full in 1932. Subsequent studies by others have shown that vitamin C had indeed been identified.

The following facts in chronological order are evident from the above analysis of the statements appearing in the literature:

(1) Szent-Györgyi first isolated "hexuronic acid" but viewed it only as a reducing substance associated with vitamin C (1928).

(2) McKinnis and King first published a positive suggestion that hexuronic acid is vitamin C (1930).

(3) King and his students carried out a sustained study of vitamin C resulting in the isolation of the active substance in the crystalline form and first stated that the crystalline substance was apparently identical with Szent-Györgyi's hexuronic acid (April 1, 1932).

(4) Fifteen days after King and Waugh published, Svirbely and Szent-Györgyi gave their first evidence that hexuronic acid has anti-scorbutic properties, but it was not until May 7, 1932, that they stated that "Vitamin C is a single substance and identical with hexuronic acid."[12]

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11 *Nature*, 129: 576, 1932.
12 *Nature*, 129: 690, 1932.
13 *Jour. Biol. Chem.*, 97: 325, 1932.
14 *Biochem. Jour.*, 26: 865, 1932.

NON-TRANSMISSIBILITY OF TRICHINELLIASIS IN PIG

A sow with a bodyweight of about 550 pounds has been fed Trichinellas on the 35th, 56th, 80th and 103rd day of its pregnancy. Each time about 3,000 Trichinellas have been given. The age of the Trichinellae, which had been raised in mice from a strain originally isolated from pork sausages, was from three to four months.

The sow farrowed a litter of eleven pigs eleven days after the last infection. About two weeks later lactation ceased.

Six of the young pigs have been autopsied and their striated muscles digested during the first three weeks after birth; similarly, the remaining five pigs during the next three weeks. In none of the little pigs could Trichinellas be found. The diaphragm of the sow contained 434 Trichinellae per gram of muscle.

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THE PROGRESSIVE CONFUSIONAL SYNDROME FOLLOWING INJURIES TO THE CERVICAL PORTION OF THE SPINAL CORD[1]

IN a large proportion of cases of fracture of the cervical vertebrae, mental symptoms of loss of memory, confusion, hallucination and even delirium have been observed. Such symptoms have usually been considered the result of cerebral contusion or concurrent disease, and so of course they may be in many instances. Similar symptoms have been observed, however, in six cases of non-traumatic injury to the spinal cord which are being reported in more detail elsewhere. One of them was a chordotomy for pain, two chordotomies for athetosis, one a pathologic fracture from tuberculosis of the spine, one a spontaneous hematomyelia and one a rapidly progressing sarcoma. All the patients died; in three the circulation appeared to fail before the respiration.

1 From the Neurological Unit, Boston City Hospital, and the Department of Neurology, Harvard Medical School.