

## SCIENCE NEWS LETTER

VOL. XXVI

No. 706

The Weekly  
Summary of  Current  
Science

Published by

## SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid; two years \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

Canadian and Foreign subscribers please add \$1 a year to regular subscription rates to cover postage. In requesting change of address, please give your old address as well as the new one in notification to Circulation Department, SCIENCE NEWS LETTER, 21st and Constitution Ave., Washington, D. C., at least two weeks before change is to become effective.

Advertising rates furnished on application.

## Board of Trustees of Science Service

*Honorary President*, William E. Ritter, University of California. Representing the American Association for the Advancement of Science, J. McKeen Cattell, *President*, Editor, Science, Garrison, N. Y.; Burton E. Livingston, Johns Hopkins University, Baltimore, Md.; Raymond Pearl, Director, Institute for Biological Research, Johns Hopkins University, Baltimore, Md. Representing the National Academy of Sciences, W. H. Howell, *Vice-President and Chairman of Executive Committee*, Johns Hopkins University, Baltimore, Md.; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, Calif.; David White, Senior Geologist, U. S. Geological Survey. Representing National Research Council, Vernon Kellogg, Secretary Emeritus, National Research Council, Washington, D. C.; C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry, Washington, D. C. Representing Journalistic Profession, John H. Finley, Associate Editor, New York Times; Mark Sullivan, Writer, Washington, D. C.; Marlen E. Pew, Editor of Editor and Publisher, New York City. Representing E. W. Scripps Estate, Harry L. Smithton, *Treasurer*, Cincinnati, Ohio; Robert P. Scripps, Scripps-Howard Newspapers, West Chester, Ohio; Thomas L. Sidlo, Cleveland, Ohio.

Director, Watson Davis; Staff writers: Frank Thone, Emily C. Davis, Jane Stafford, Marjorie Van de Water, Robert Potter; Librarian, Minna Gill; Sales and Advertising Manager, Hallie Jenkins.

Copyright, 1934, by Science Service, Inc. Reproduction of any portion of the SCIENCE NEWS LETTER is strictly prohibited since it is distributed for personal, school, club or library use only. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services listed by Science Service, details and samples of which will gladly be sent on request.

Members of the American Association for the Advancement of Science have the privilege of subscribing to the SCIENCE NEWS LETTER at the reduced price of \$3 per year. Application for this privilege should be accompanied by privilege card obtained from the Permanent Secretary, A. A. S., Smithsonian Institution Building, Washington, D. C.

Publication Office, 1930 Clifton Ave., Baltimore, Md., Editorial and Executive Office, Constitution Ave. at 21st St., N. W., Washington, D. C.

Address all communications to Washington, D. C. Cable address: Scienserv, Washington.

Entered as second class matter October 1, 1926, at the post-office at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark. U. S. and Canadian Patent Offices.

## MEDICINE

Kojic Acid Provides Clue  
To Cause of Convulsions

EXPERIMENTS which demonstrate for the first time that a relatively simple and common product of sugar metabolism may have toxic results have been reported to the American Chemical Society by Dr. Theodore E. Friedemann of Chicago University's department of medicine.

Dr. Friedemann's experiments provide a clue to the cause of convulsions, for he has demonstrated that certain sugar derivatives, produced in the course of metabolism, can bring on convulsions.

The Chicago experimenter found that kojic acid, when injected into animals intravenously or subcutaneously in relatively small amounts, brought on drowsiness and, in some instances, sleep. Slightly larger doses produced distress and epileptiform convulsions. Still larger doses resulted in repeated fits and, eventually, death. The convulsions were markedly similar to those produced by means of large doses of insulin.

The symptoms of the animals on which he experimented suggested that kojic acid has a specific effect on nervous tissue, and its chemical characteristics suggested that it might have an effect on some enzyme system essential to cell respiration. Experiments carried out at his suggestion showed marked inhibition of tissue oxidations by kojic acid.

## Produced By Molds

Kojic acid is easily formed from glucose by the ordinary metabolic processes of many unicellular organism. It is produced in large quantities by molds and certain aerobic bacteria, and it has also been synthesized from glucose.

The chemical structure of kojic acid is very similar to glucose, which is the building stone of ordinary cane sugar and starch. Both kojic acid and glucose have six carbon atoms and the same chemical ring structure. Kojic acid is derived from glucose through oxidation of the third carbon atom, which is followed by a splitting-out of three molecules of water. It is not a true acid, but derives its acidic properties from the phenolic hydrogen atom. Its most remarkable property, Dr. Friedemann

stated, is its extremely high affinity for iron. Such a marked affinity for iron is possessed by no other sugar or protein derivative so far isolated by chemists.

The Chicago investigator pointed out that kojic acid represents an early stage in the oxidation of glucose and, in animals, might be the result of impaired metabolism, and that the conditions preceding convulsions often are such as might lead to the production in the brain of partial or intermediate oxidation products like kojic acid.

## Poison From Sugar

"The possibility of autointoxication by sugar," Dr. Friedemann declared, "has never been seriously considered. Autointoxication in the truest sense is the result of poisoning by the body's own metabolic products. Many highly reactive substances have been isolated from the tissues and body fluids of animals. Most of these substances possess a complex chemical structure and practically all contain nitrogen. Our experiments show that kojic acid, a substance of simple structure and containing no nitrogen, can have a profoundly toxic action, especially on nervous tissue. When we consider the ease with which aerobic microorganisms can convert glucose from a relatively unreactive and harmless substance into a substance highly reactive and toxic by a very slight change within the molecule, and when we consider further that from 50 to 90 per cent. of our energy is derived from the metabolism of glucose (the average adult burns about one pound of glucose each day), then we should consider the possibility of autointoxication by the abnormal metabolism of carbohydrate in many clinical conditions which are accompanied or terminated by convulsions."

Science News Letter, October 20, 1934

Only six elderly Indians alive today can speak Tonkawa, an Indian language of Texas.

In a survey of milk consumption by almost 30,000 city families in the United States, it was found that the average family bought only about half a pint daily.