of Conservation. Section II held a symposium on the "Chemistry of the T.V.A. Phosphate Fertilizers," given by the chemists of that division. Both created a great deal of interest and discussion.

The Academy Award from the American Association for the Advancement of Science was voted to J. Allen Tower, assistant professor of geography, Birmingham-Southern College, Birmingham, for "Preparation of an Atlas of Alabama and a Geography of Alabama." Birmingham-Southern College was selected as the next meeting place, the date to be set by the college in collaboration with the academy president.

Social features of the meeting included a tea for the visiting ladies at the home of Mr. and Mrs. E. D. Emigh. Other hostesses for this function were Mrs. Patrick H. Smyth, Mrs. Peter A. Brannon and Mrs. Haygood Paterson. The annual academy banquet was held at the Jefferson Davis Hotel on Friday night, with Haygood Paterson, commissioner of agriculture and industry, as toastmaster. The presidential address, "Science and the World Crisis," given by P. H. Yancey, featured the banquet. This was preceded by the address of welcome, made by Dr. Hubert Searcy, president of Huntingdon College, with response by Walter B. Jones, director of the State Department of Conservation. A motion picture, "The River," given through the courtesy of the National Park Service, closed the banquet, which was followed by an informal social in the ballroom of the hotel. On Saturday morning a geology field trip to old Fort Toulouse and Wetumpka was conducted by W. B. Jones and J. Y. Brame. Other attractions open to visitors were the State Health Laboratories, U. S. Weather Bureau, Montgomery Museum, and Seeing Montgomery Trip. Luncheon was served on both days at Pratt Hall, the college dining room.

Officers for 1939–1940 were elected as follows: *President,* George D. Palmer, associate professor of chemistry, University (elected last year); *President-elect,* C. M. Farmer, head of the biology department, State Teachers College, Troy; *Vice-Presidents and Chairmen of their respective sections:* Samuel Reed Damon, director of the Bureau of Laboratories, Alabama State Department of Health, Section I, Biology and Medical Sciences; Ingomar M. Hostetter, associate professor of mathematics, Howard College, Birmingham, Section II, Physics, Chemistry and Mathematics; A. J. Westland, seismologist, Spring Hill College, Mobile, Section III, Geology, Anthropology and Archeology; and E. D. Emigh, Weather Bureau, Montgomery, Section IV, Industry, Economics and Geography; *Editor of the Journal,* E. V. Jones, Birmingham-Southern College, re-elected for three years; councilor of the American Association for the Advancement of Science, J. H. Coulliette, professor of physics, Birmingham-Southern College, re-elected for one year. The treasurer, John Xan, head of the chemistry department, Howard College, has two more years to serve, and the secretary, Septima C. Smith, associate professor of zoology, University, has one more year.

An executive council meeting and a morning and afternoon business session, which disposed of routine business, were held on Friday. Three important new committees were approved for appointment by the president for expanding the personnel, influence and value of the academy to the members and to the state. These are: The Committee on the Promoting of Membership and the Activities of the Academy; the Committee on Research and the Publications Committee, an editorial board which is to assist the editor in furthering the quality of publications in the journal.

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SPECIAL ARTICLES

ISOLATION FROM BEEF PANCREAS OF A CRYSTALLINE PROTEIN POSSESSING RIBONUCLEASE ACTIVITY

A CRYSTALLINE protein which acts as a powerful digestive enzyme for yeast nucleic acid has been isolated from fresh beef pancreas. The digestion of the acid is accompanied by little, if any, release of inorganic phosphorus. The split products, unlike the undigested yeast nucleic acid, are not precipitable with glacial acetic acid or in 0.5 M hydrochloric acid. The products of digestion readily diffuse through collodion or Cellophane membranes that are impermeable for the undigested yeast nucleic acid. The nuclease activity of the crystalline protein is only very slowly diminished when boiled at pH 2.0. Boiling at pH 5.0 or higher brings about a gradual denaturation of the protein with a corresponding percentage loss of nuclease activity.

The nuclease activity of the new crystalline protein appears to correspond to the thermostable pancreatic nuclease activity described first by Jones[1] and later confirmed by Dubos,[2] Dubos and Thompson[3]

[1] W. Jones, *Am. Jour. Physiol.*, 52: 203, 1920.

[2] R. J. Dubos, SCIENCE, 85: 549, 1937. Dr. Dubos kindly tested the effect of the new crystalline material on the staining characteristic of two strains of Pneumococcus (heat killed). He found "that their staining characteristics are altered after a few hours incubation"; like the material which he described,[3] the new crystalline protein "decreases the affinity of the bacterial cells for basic dyes" (personal communication from Dr. Dubos).

[3] R. J. Dubos and R. H. S. Thompson, *Jour. Biol. Chem.*, 124: 501, 1938.

and Schmidt and Levene.[4] The latter authors considered the thermostable pancreatic nuclease to have only a depolymerizing effect on nucleic acid without the production of Cellophane dialyzable products such as mononucleotides. Hence they named the enzyme "ribonucleodepolymerase." However, as mentioned before, the split products formed from yeast nucleic acid by the new crystalline protein were found to diffuse readily through collodion and Cellophane membranes; hence the more general term "ribonuclease" has been provisionally retained for this crystalline protein until more definite information becomes available about the chemical nature of the process.

The procedure for the isolation of the crystalline protein follows: Fresh beef pancreas is extracted with cold 0.25 N sulfuric acid, as described in the publications on the isolation of chymotrypsinogen and trypsinogen.[5] The acid extract is brought to 0.7 saturation with solid ammonium sulfate and filtered. The filtrate is then brought to 0.8 saturation with more ammonium sulfate and is refiltered with suction.

Crystallization: 10 gm of the semi-dry precipitate is dissolved in about 10 ml of water. The solution is filtered with the aid of about 0.5 gm of Standard Super-Cel (Celite Corporation) through soft filter paper on a small Büchner funnel; the residue on the paper is washed with water. The combined filtrate and washings are brought to a final volume of 20 ml. Saturated ammonium sulfate is then added slowly with stirring until a very faint turbidity appears. The pH of the solution is adjusted first to about pH 5.0 (brick red color with 0.01 per cent. methyl red solution on test plate) with the aid of a few drops of 1.0 N sodium hydroxide and then to pH 4.2 (orange color with 0.01 per cent. methyl orange) by means of 1.0 N sulfuric acid. The solution is allowed to stand at about 20° C. An amorphous precipitate rapidly forms. This changes within one or two days into a mass of fine needles or aggregates of long thin plates. The crystals are filtered after 2 or 3 days. The filtrate on further addition of saturated ammonium sulfate yields more crystals. The recrystallization is performed by adding saturated ammonium sulfate to an aqueous solution of the crystals until a very faint turbidity appears.

The crystalline material contains about 16 per cent. total nitrogen; 7 per cent. of the total nitrogen is free amino nitrogen. It does not diffuse through ordinary collodion membranes to any significant amount.

A solution of the crystalline material is precipitated completely in 10 per cent. trichloracetic acid and incompletely in 2.5 per cent. trichloracetic acid. It gives the usual protein color tests. The tyrosine-tryptophane content is about 15 per cent. of the total dry weight. The ribonuclease activity of the material becomes constant after the second crystallization.

Further investigation of the physical and chemical properties of the new crystalline protein and of the chemical changes brought about by its nuclease activity is in progress.

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[4] G. Schmidt and P. A. Levene, *Jour. Biol. Chem.*, 126: 423, 1938.

[5] M. Kunitz and J. H. Northrop, SCIENCE, 78: 558, 1933; 80: 505, 1934; *Jour. Gen. Physiol.*, 18: 433, 1935; 19: 991, 1936.

ISOSTERISM IN THE VITAMIN B COMPLEX

THE physiological effect of both nicotinic acid and thiamine is characterized by exceptional specificity. Numerous investigations in the recent literature show that even small changes in the loading of these two heterocycles greatly affect their physiological activity. It seemed of special interest, therefore, to investigate some isosters of these two vitamins.

The concept of isosterism as proposed by Grimm[1] and investigated by Erlenmeyer[2] and others has been applied with particular success to nuclear derivatives where ring sulfur and an aromatic –CH=CH– group are mutually replaceable. According to them a 3-substituted pyridine compound is isosteric with a 5-substituted thiazole compound. This permits consideration of a relation between nicotinic acid and thiamin which has hitherto been unsuspected.

We have found that thiazole-5-carboxylic acid, isosteric with nicotinic acid,[3] stimulates the growth of dysentery bacilli on Koser's synthetic medium.[4] Its activity is of the order of .1 per cent. of that of nicotinic acid. Its activity in curing black tongue in dogs has been investigated to some extent, but the results have been inconclusive.

2-methyl-3-β-hydroxyethyl-N-[(2-methyl-6-amino-pyrimidyl-(5))-methyl]-pyridinium bromide hydrobromide isosteric with Vitamin B_1 hydrobromide has been synthesized by condensation of 2-methyl-3-β-hydroxyethyl pyridine with 2-methyl-5-bromomethyl-6-amino pyrimidine hydrobromide. 2-methyl-3-acetyl pyridine was obtained from 2-methyl-3-cyanopyridine by a Grignard reaction. Bromination of the ketone followed by hydrolysis and Clemmensen reduction yielded the new 2-methyl-3-hydroxyethyl pyridine (picrate M.P. 129° uncorr.). Fed to a series of rats with medium or acute polyneuritic symptoms the new condensation product shows Vitamin B_1 activity. The experimental data do not as yet permit exact quantita-

[1] *Naturw.*, 17: 535–40, 557–64, 1929.

[2] *Helv. Chim. Acta.*, 16: 733–8, 1933.

[3] Erlenmeyer, *Helv. Chim. Acta.*, 20: 204, 1937.

[4] *Jour. Infectious Diseases*, 62: 212, 1938.