of some such process. Though the literature has not been analyzed from this point of view, the burst of activity in physiological and psychobiological investigation coming in the past decade must in some degree reflect the stimulus afforded by the creation of laboratories for primate research by the foundations.

The break in the orderly march of these subjects occasioned by the war and extending well into the post-war years, is cause for speculation on the course these graphs will take in the next five-year period.

T. C. RUCH
J. F. FULTON

LABORATORY OF PHYSIOLOGY,
YALE UNIVERSITY SCHOOL OF MEDICINE

SOCIETIES AND MEETINGS

THE TENNESSEE ACADEMY OF SCIENCE

THE forty-ninth meeting of the Tennessee Academy of Science was held in Nashville on November 28–29, at the George Peabody College for Teachers. President F. L. Wren presided. Friday and Saturday mornings were devoted to general sessions, with Friday afternoon reserved for sectional meetings. Fifty papers were presented.

The following chairmen presided at the section meetings on Friday afternoon: *Botany:* D. M. Brown, State Teachers College, Johnson City; *Geology and Geography:* R. A. Laurence (for B. C. Moneymaker), Tennessee Valley Authority, Chattanooga; *Mathematics:* W. L. Miser, Vanderbilt University, Nashville; *Chemistry:* L. J. Bircher, Vanderbilt University, Nashville.

The annual dinner was held on Friday night at the James Robertson Hotel. Vice-President D. M. Brown served as toastmaster. The address of Retiring President F. L. Wren was on the timely topic, "Our Public Trust," in which the speaker emphasized the new role and responsibility of science in the world of to-day. A beautifully colored motion picture, "The Sportsman's Dollar," was shown by the courtesy of the Educational Service of the State Department of Conservation.

At the meeting of the executive committee on Friday and at the general business session on Saturday, the following business was transacted: (1) A committee appointed to proceed in the organization of a Junior Academy of Science. (2) A committee appointed to canvass the state to determine the number and type of science groups with the possibility of offering student membership in the academy at a reduced rate. (3) Jesse M. Shaver was elected representative of the academy on the Council of the American Association for the Advancement of Science. (4) Recommendations will be made to the incoming executive committee that in place of the regular spring meeting the academy convene with the newly organized Southern Association for the Advancement of Science.

New officers for 1941–42 were elected as follows: *President:* D. M. Brown, State Teachers College, Johnson City; *Vice-President:* C. S. Shoup, Vanderbilt University, Nashville; *Secretary-Treasurer:* Kendall E. Born, State Division of Geology, Nashville. *Section Chairmen: Botany:* Frances Ranney Bottom, George Peabody College for Teachers, Nashville; *Geology and Geography:* Robert A. Laurence, Tennessee Valley Authority, Jefferson City; *Mathematics:* J. A. Cooley, University of Tennessee, Knoxville; *Chemistry:* C. A. Buehler, University of Tennessee, Knoxville.

KENDALL E. BORN,
Secretary-Treasurer

SPECIAL ARTICLES

A NEW PROTEASE FROM BROMELLA PINGUIN L.[1]

THE juice obtained from the fruit of the *Bromelia pinguin* L., commonly called "maya" in Puerto Rico, has a pleasantly acid taste, but produces a burning sensation when applied to the hand or lips, peeling the skin after a few hours.

Suspecting the presence of a proteolytic enzyme in this juice, it was tested by the milk-clotting method of Balls and Hoover,[2] as well as by the formol titration, using gelatin as a substrate. Similar tests were performed on heat-inactivated juice which served for control tests. The result of these trials is reported in Table I, which shows the presence of a protease in the juice.

To obtain the crude enzyme, 100 cc of fresh maya juice were filtered with celite. To the filtered juice,

TABLE I

Juice	pH	Milk clotting units per cc of juice*	Formol titration. cc 0.01N NaOH per cc of juice
Fresh	4.0	50	3.80
Boiled	4.0	No clotting	1.10

* A milk-clotting unit is defined here as the amount of enzyme preparation required to clot 5 cc of standard milk solution from dried milk in one minute at 40° C.

[1] Published with the approval of the director of the School of Tropical Medicine and of the director of the Agricultural Experiment Station of the University of Puerto Rico. A cooperative project.

[2] A. K. Balls and S. R. Hoover, *Jour. Biol. Chem.*, 121: 737, 1937.

pH 4.0, 300 cc of acetone were added and the precipitate obtained, separated by centrifugation. The precipitate was dissolved in 100 cc of 0.02 M NaCN and then reprecipitated by the addition of another 300 cc of acetone. This last precipitate was washed with acetone and ether and then placed in a vacuum desiccator over $CaCl_2$. The dried precipitate was pulverized in a porcelain mortar until a fine, whitish powder was obtained. The yield of crude enzyme was 5 gm.

The activity of this preparation, when in solution at a pH 5.9, is of 390 milk-clotting units per gm. This enzyme is a typical papainase, as it is reversibly inactivated by H_2O_2 and iodine, and activated by NaCN and cysteine. Like other papainases, this enzyme digests live tissue. *Macracanthorhynchus hirudinaceus* (from hog intestine) were digested by a 1 per cent. solution of our enzyme preparation in less than 12 hours, when incubated at 40° C at pH 5.5. Controls in the same solution, previously boiled, were not digested.

The amount of crude enzyme that can be recovered from maya juice is a little over 17 times the amount of bromelin obtained from the average pineapple juice. Both enzyme preparations have about the same milk-clotting activity, therefore the maya may prove, in the future, to be an important source of a papain-like enzyme.

Having found in the available literature no account of this enzyme, we submit this brief report, which will be followed in due course by a more complete description, and suggest the name "pinguinain" for this new enzyme, as the generic name of the plant source has already been used in naming bromelin, the enzyme obtained from the pineapple.

CONRADO F. ASENJO
M. DEL C. CAPELLA DE FERNANDEZ
SCHOOL OF TROPICAL MEDICINE AND
AGRICULTURAL EXPERIMENT STATION,
UNIVERSITY OF PUERTO RICO

PARTICULATE GLYCOGEN*

BY fractional centrifugation of finely dispersed liver suspensions a submicroscopic particle containing glycogen was obtained. This particle has an approximate sedimentation constant of $4{,}000 \times 10^{-13}$. This means a particle size much larger than the tobacco mosaic virus, which has a molecular weight of 15–20 million and a sedimentation constant of $191\text{–}239 \times 10^{-13}$.[1] The particle is stable at 37° C. but can be dispersed by heating at 100° C. for several hours. It may also be dispersed by trichloracetic acid or potassium hydroxide. The dispersed glycogen can not be separated at 12,000 r.p.m.; this is the speed used to separate the original particle. According to Oakley and Young,[2] glycogen separated by the usual methods has a molecular weight of only two million. Clearly, then, particulate glycogen is an aggregate of smaller glycogen units.

The particle contains a high percentage of water; however, practically all the dried residue is glycogen. The dried particle also contains about 1 per cent. protein. This protein may play an important role in the maintenance of the particle, inasmuch as all the agents which disperse the particulate glycogen markedly alter the protein. None of these is thought to alter the properties of glycogen.

It is clear that, if this protein, or some other agent, combines with the dispersed glycogen as the latter is synthesized in the liver cell the glycogen will be removed from solution. By the law of Mass Action the enzymatic reaction

$$\text{Glucose-1-phosphate} \rightleftharpoons \text{Glycogen} + \text{Phosphate}$$

would be shifted in favor of glycogen synthesis, therefore facilitating glycogen storage in the liver. The concentration of glucose in the liver cell would be diminished. This would favor the removal of glucose from the blood stream and a consequent lowering of blood sugar.

The action of this coacervating agent, which may be protein, seems to parallel the action of insulin, because insulin is known to lower blood sugar and facilitate glycogen storage in the liver. The relationship, if any, between the protein contained in particulate glycogen and insulin is being investigated.

I should like to express my deep appreciation to Professor R. R. Bensley for his suggestions, criticisms and constant encouragement.

ARNOLD LAZAROW
UNIVERSITY OF CHICAGO

AN UNIDENTIFIED VIRUS WHICH PRODUCES PNEUMONIA AND SYSTEMIC INFECTION IN MICE[1]

IN the course of attempts to isolate viruses by direct inoculation of albino Swiss mice with throat washings from clinical cases of influenza, non-influenzal pneumonias were frequently encountered in the passage mice. The pneumonias observed were of two types. One type was grossly indistinguishable from that produced by influenza virus, and the etiological agent of this type was found to be a filtrable virus

* This work was aided by a grant from the Dr. Wallace C. and Clara A. Abbott Fund of the University of Chicago.

[1] Erriksson-Quensel and Svedberg, *Jour. Am. Chem. Soc.*, 58: 1863, 1936.

[2] Oakley and Young, *Biochem. Jour.*, 30: 868, 1936.

[1] These investigations were financed largely by a grant from the International Health Division of the Rockefeller Foundation.