ical Society, which now has 22,374 paid members, the largest number in its history, will be held in Cincinnati, Ohio; the autumn meeting in Detroit, Mich. In 1941 the spring meeting will be in St. Louis, and the autumn meeting in Atlantic City under the auspices of the Philadelphia section.

THE Bronx Health Unit, New York City, which is being erected at a cost of $400,000, was dedicated by Mayor Fiorello La Guardia on September 18. It is expected that the building will be completed by May, 1940. Health Commissioner John L. Rice presided. Invited speakers included Borough President James J. Lyons, Dr. George E. Milani, president of the Bronx County Medical Society, and Commissioner Irving V. A. Huie, of the Department of Public Works. The unit will include an auditorium, an exhibit room for health education, a staff lunchroom and kitchen and an air-conditioned storage vault in the basement. The first floor will contain the Bronx offices and child health, dental and maternal care quarters. Tuberculosis and venereal disease prevention activities will be housed on the second floor. Administrative headquarters for the health officer and his staff and health education and conference rooms will be on the third floor. The fourth floor will include borough offices for the sanitary superintendent, the Bureaus of Food and Drugs and Preventable Diseases and offices for visiting nurses and cooperating health agencies.

THE forty-fourth annual meeting of the American Academy of Ophthalmology and Otolaryngology will be held in Chicago from October 8 to 13 at the Palmer House. The academy will present courses of instruction to be given by more than a hundred specialists. There will be four afternoon programs of motion pictures and a scientific exhibit in addition to its formal scientific program. There will be one joint session at which Dr. George M. Coates, Philadelphia, will deliver his presidential address and Dr. Burt R. Shurly, Detroit, will be introduced as the guest of honor for the year and will deliver an address. At this session a symposium on essential hypertension will be presented by Drs. Albert C. Furstenberg, Ann Arbor, Mich., speaking from the standpoint of the otolaryngologist; Henry P. Wagener, Rochester, Minn., the ophthalmologist, and Roy W. Scott, Cleveland, the internist. Two foreign guests will address the section meetings, which will be held on alternate afternoons. Professor Josef Igersheimer, Istanbul, will discuss "The Optic Nerve and Diseases of Hypertension," and Arthur DeSa, Pernambuco, Brazil, will speak on "Ethmoiditis."

THE New York State Geographical Association will meet on September 23 at Syracuse University. In the morning there will be a series of papers on the teaching of geography. In the afternoon, Dr. Roy Price will lead a round table discussion on "The Relation of Geography to the Regents Investigation," and a similar discussion will be conducted by Dr. George B. Cressey on "The Place of Geography in the Secondary and High School." Dr. C. Grove Haines, of the department of history of Syracuse University, will speak at the banquet on "The Relationship of Geography and History in the Present European Crisis."

DISCUSSION

NUTRITIONAL PHYSIOLOGY OF THE ADULT RUMINANT[1]

IN this monograph Ritzman and Benedict set forth results of their own researches and also undertake to present a review "chiefly of the American literature" dealing with "the researches of the last few decades."

The authors' investigations are set forth *in extenso,* but the recognition of the work of others is highly inadequate.

The digestibility of the ash of feeding stuffs, as indicated by comparison of the constituents of feed and feces, is discussed (p. 13) as though significant, whereas it is thoroughly understood that the quantities of mineral substances in the feces signify nothing definite in relation to the digestibility of these components of the food.

[1] Comments on the monograph on this subject by E. G. Ritzman and F. G. Benedict, Carnegie Institution of Washington Publication No. 494.

The authors write uncritically as to certain practical matters; thus (p. 21) their statement that "at the larger stock yards of the country—fat steers are always bought subject to a 3 per cent. shrinkage in weight" is not true. Upon arrival at the central live-stock markets cattle are first given an opportunity to eat and drink. After they have been sold the packer-buyer pays for them at their actual weight, as they go over the scales, after eating and drinking.

In regard to methane production Ritzman and Benedict say (p. 26), "On the basis of seven "discordant results" in their calorimeter experiments Armsby and Fries concluded that 4 grams of methane result from every 100 grams of carbohydrate ingested, and this factor was later used largely by Forbes and by Mitchell to estimate the losses of energy by this path."

As a matter of fact the methane production has been experimentally determined in every calorimetric experiment conducted with cattle at this institute, and the writer has never used the above-mentioned factor for any purpose.

The authors present a graph (p. 75) in which the heat production is plotted against the insensible perspiration; and this graph is interpreted (p. 77) as showing that the insensible loss may be used as a basis of computation of the heat production; but the experiments involved were all conducted at about the same plane of nutrition. The results, therefore, do not establish a relationship of general significance. The authors should certainly have given careful consideration to Kriss's extensive studies of the relationship of the insensible loss to the heat production in cattle.

In regard to the "profound," "seriously challenging," "extraordinary" and "astounding" variability of the basal metabolism as observed with cows (p. 86)—the causes of the variability observed were not determined. Observations on the proximity of the period of oestrum to the time of determination of the basal metabolism would have been pertinent, as also a discussion of the normal body temperature of cattle, which is much more labile than is that of human beings.

One would prefer to maintain an open mind on this subject of lability of the basal metabolism of cows until the reasons therefor have been clarified, but we are told (p. 129) that "the overwhelming evidence presented here makes it obligatory on the part of every research worker to accept the demonstrated fact that the large domestic ruminant (particularly the genetically highly specialized dairy cow) has a very labile basal metabolism."

An attempt is made to support these findings in regard to cows by reference to determinations of so-called "standard metabolism" in steers (p. 130) by measurement of the heat production "in two or three successive half-hour periods while the animal was standing quietly, 24 hours after food."

According to the writer's understanding, measurements of the heat production of steers under the conditions stated would possess no standard significance, because of the brevity of the periods of observation and because the alimentary fill would be in no definite status.

Ritzman and Benedict imply (p. 178) that their observations on the lability of the basal metabolism of cows invalidates the four remarkably smooth and consistent curves of heat production in relation to the plane of nutrition, as determined, with steers as subjects, by Forbes and associates.[2] In our opinion the smoothness of these curves shows that the lability of the basal metabolism of cows, as observed by Ritzman and Benedict, is not characteristic of the metabolism of steers under successful experimental control.

[2] *Jour. Agr. Research*, 37: 253–300, 1928; 40: 37–78, 1930.

In discussing the energy expense of food utilization Ritzman and Benedict (p. 149) deplore the fact "that such a confusion of expressions to describe one and the same effect (the heat increment) exists," and then propose two more expressions for the same purpose. In this relation they state that "the Pennsylvania investigators" compute the heat increment to the basis of standing half the time and lying half the time. As a matter of fact the *heat production* has properly been so treated, but the heat increment, never.

Ritzman and Benedict conclude (p. 99) that the increase in heat production during standing exceeds that during lying to a greater extent during feeding than during fast, but the values they determined for percentage increase due to standing during fast all lie within the range of variation of such determinations during feeding, and there seems to be no statistical basis for the conclusion drawn.

As to the method of estimating the heat increment the authors say (p. 149): "Unfortunately the stimulating effect of food can at present only be determined by measuring the metabolism under this influence of food and without it, so that fasting becomes a necessary part of the technique of its determination."

The authors thus seem to ignore the fact (of which they are doubtless aware) that Kellner, Armsby and Forbes and associates have all measured heat increments for production by the differential method, above maintenance, without reference to fast; and they also ignore the conclusion of Forbes and associates (emphasized in several papers) that heat increments depending on measurements of heat production at planes of nutrition below the point of energy equilibrium are lower than the truth by the amount that the food diminishes the production of heat at the expense of body nutrients.

In the light of this conclusion Ritzman and Benedict's determination (pp. 169–176) of the dynamic effects of feeds with the basal metabolism as the base value is lacking in definite significance.

Ritzman and Benedict's idea (p. 186) that the high basal metabolism of lactating cows "suggests definitely that the stimulating effect of food is as much an essential to lactation as is the energy and other substance matter from which the milk is formed" seems to us to misinterpret a residual effect—a carrying over into the measurement of the basal metabolism—of the habit of high heat production resulting from the high food consumption of lactation.

Finally, the authors' assumption (pp. 187–8) "that the deposit value of metabolizable energy in amounts above maintenance is the same as for maintenance," based upon an opinion published by Armsby in 1919,[3] ignores extensive work on this subject which was

[3] *Jour. Agr. Sci.*, 9: 186, 1919.

planned and in the main conducted by Armsby, and, after Armsby's death, was completed by the writer and his associates, and published in 1926.[4]

In this work the energy outgo during fast was used as the base value of heat increments of food for maintenance, and the heat production of maintenance was used as the base value of heat increments of food for body increase and milk production. On this basis the relative efficiency of utilization of metabolizable energy for maintenance, milk production and body increase was found to be, on an average, as 79.1, 72.8 and 57.3 per cent., respectively.

During recent years, however, the writer and his associates have advocated another point of view in this relation, involving the conception of a new base value of heat production—that of fast minus the energy expense of utilization of the body nutrients katabolized during fast. The present indication, from investigations not yet completed, is that from this more fundamental point of view the utilization of metabolizable energy for maintenance and for moderate amounts of body increase may be indeed essentially the same.

E. B. FORBES
THE PENNSYLVANIA STATE COLLEGE

HEPARIN AND BLOOD CLOTTING

IN a recent note[1] on this topic Astrup emphasizes the need for a plasma (or serum) factor necessary to the inhibitory action of heparin. It should be recognized that this was clearly enunciated by Howell and Holt[2] in the original work on heparin and, under the name of the *pro-antithrombic* (or *antithrombin-ogenic*) factor, has always held a prominent place in Howell's theory of blood coagulation. Quick[3] afforded evidence that the accessory factor was associated with the albumin rather than with the globulin fraction of the plasma proteins. Some recent investigations[4] confirm this point but stress a new interpretation which appears to clarify the "controversial statements" in the literature. It has been found that heparin readily *prevents* thrombin formation (the *antiprothrombic* action of Howell and Holt), provided that pure cephalin is used as the thromboplastic agent in forming thrombin from recalcified prothrombin. However, if tissue extracts (thrombokinase) or crystalline trypsin (thromboplastic enzyme[5]) are used instead of cephalin, the antiprothrombic action of heparin is overcome in all but the first minute or two of the process of thrombin formation.

The synergistic *antithrombic* (thrombin-*neutralizing*) effect of heparin-albumin mixtures is not dependent upon the mode of thrombin formation, in experiments which avoid thrombinolysis. Additional work is necessary to elucidate the true nature of "antithrombic" action, but there are clear indications that it shares with the process of thrombin formation a significant dependence upon the phospholipid-protein interrelationships in which a trypsin-like enzyme plays a leading rôle.

JOHN H. FERGUSON
UNIVERSITY OF MICHIGAN

[4] *Jour. Agr. Research*, 33: 483–492, 1926.

[1] T. Astrup, SCIENCE, 90: 36, 1939.

[2] W. H. Howell and E. Holt, *Am. Jour. Physiol.*, 47: 328, 1918.

[3] A. J. Quick, *Am. Jour. Physiol.*, 115: 317, 1936.

[4] J. H. Ferguson, *Proc. Soc. Exp. Biol. and Med.* (in press).

[5] J. H. Ferguson and B. N. Erickson, *Am. Jour. Physiol.*, 126: 661, 1939.

THE BLACK DYE OF THE NAVAJOS

CARNOTITE, a canary yellow mineral usually found as a powder in the sandstones and conglomerates of the Colorado Plateau, has been and still is used by the Navajo Indians to make a black dye to color the wool which they shear from their sheep to make the famous Navajo rugs.

Carnotite is known to-day to be an ore of radium, uranium and vanadium. It was not until 1898 that the chemical composition was determined by Fuedel and Cummenge, of Paris, from samples obtained from the Colorado Plateau by Kimball and Poulot. Long before that, the Navajo Indians had learned the art of preparing a rich black dye from the yellow mineral —"a uranium black." The yellow powder had formerly been reported as "yellow ochre," a form of limonite.

The writer is indebted to Mrs. Louisa Wade Wetherill, of Kayenta, Arizona, for the method used by the Navajo Indians in preparing the dye. The carnotite powder is roasted in a frying pan placed over an open fire until it changes in color from yellow to black. In a similar manner, the Navajos roast the pitch from the pinyon trees (stunted pines) that grow on the high mesas in the region. The pitch becomes brittle and breaks down to a black powder. These two black powders are then mixed and stirred into a solution prepared by boiling the entire plant of the squaw-berry bush (*Rhus trilobica*) in water until it assumes the color of tea. This makes a concentrated dye which is further diluted with water to the required strength.

In a rug which the writer obtained from the Western Navajo Indian Reservation, the uranium black dyed wool was used in combination with wools colored with natural vegetable dyes prepared from the root of the caniegra plant (wild pie plant or dock). Various colors may be obtained by varying the length of time the roots of the plant are boiled in water. The colors range from *old gold* through *greenish yellow* to a brown approximating the color of *burnt sienna*. The longer the period of boiling, the more brownish is the color obtained.

DANIEL T. O'CONNELL
THE COLLEGE OF THE CITY OF NEW YORK