SCIENCE

VOL. 98 FRIDAY, OCTOBER 22, 1943 No. 2547

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL; WARE CATTELL, assistant editor. Published every Friday by

THE SCIENCE PRESS

Lancaster, Pennsylvania

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

MINERALS' SHARE IN THE WAR[1]

By D. N. WADIA

THE Indian Science Congress meets to-day for the fourth time since the beginning of the war. This meeting, only a few hundred miles remote from one potentially active war theater, is an event which bears significant testimony to the place science has won in India. The attendance of so many members drawn from many fields of scientific activities and Government institutions from almost all parts of the country, provides gratifying proof of their devotion to the cause of science and of their subscribing to its exacting ideals. Calcutta has once again made its contribution to the spread of science in India by inviting the congress for the sixth time. We keenly appreciate the warm hospitality it has accorded us under conditions of difficulty we all realize, and it is no mere formal expression of thanks that in your name and on your behalf, I tender to the organizers of this session. A distinguished citizen of India was to have presided at this meeting and no one here shares, more keenly than I, in the disappointment at his absence to-day. I seek your forbearance at my having to address you because of an existing rule which requires your president of the foregoing year to continue in office until its assumption by his successor. Pandit Jawaharlal Nehru's contributions to science in India have not been in the limelight, but they have been a leavening influence in the organization and working of the National Planning Committee, which, since 1939, is engaged in the great task of coordinating applied science with productive industry in every field, industrial, educational, cultural and organizational. Ladies and gentlemen, please believe me, I sympathize with you for having missed his rousing address.

Death has removed from our midst during the year several distinguished workers in different fields of science. The Indian Science Congress mourns the deaths of Rai Bahadur Ramprasad Chanda, anthropologist, archeologist and student of Indian art; Rai Bahadur Sarat Chandra Ray, Tibetan scholar, archeologist and founder-editor of *Man in India;* Mr. Gauripati Chat-

[1] General presidential address before the Thirtieth Indian Science Congress, Calcutta, 1943.

coagulation or apparent alteration of its properties. These facts form the basis of the procedure used in preparing large amounts of the modified plasma for physiologic experiments. Originally ultrafiltration was used to "wash" out the excessive salt formed from the neutralization of sodium hydroxide. This process is slow and bacterial contamination is difficult to avoid. At the present time the routine procedure is as follows. A special citrated beef plasma of low bacterial count is obtained in five-gallon lots (from Armour and Company through the courtesy of Dr. Julius D. Porsche). To each liter of the plasma is added 100 cc of 22 per cent. sodium hydroxide, both of which have been warmed to 37°. The mixture is placed in a 37° incubator for one hour, after which 1.0 normal hydrochloric acid is added slowly with brisk stirring until a reaction of pH 4.3 is reached. The precipitate is separated and washed with a citric acid-disodium phosphate buffer at pH 4.3. The precipitate is then finely suspended in about 700 cc of pyrogen-free distilled water and 30 cc of 22 per cent. sodium hydroxide added slowly as the suspension is vigorously stirred. The protein dissolves very rapidly and as soon thereafter as possible 1.0 normal hydrochloric acid is added until the reaction is pH 7.3–7.4. The volume is then made one liter. If the solution is turbid it becomes clear on warming. It is sterilized by passage through a Berkefeld filter. The final product is a slightly opalescent solution with the appearance and viscosity of serum. An alternative procedure is to neutralize the mixture when it is taken from the incubator and then add 4 volumes of 95 per cent. alcohol. The precipitate is washed several times with 95 per cent. alcohol and finally extracted with acetone until the filtrate is colorless. The protein, when dry, is a fluffy white powder from which solutions of a desired concentration can be prepared by adding saline and heating for about 15 minutes in an Arnold sterilizer. Beef serum can be used, as well as plasma, in the procedure described and gives a satisfactory end product. With serum the solution is lighter in color and can be more easily passed through a Berkefeld filter.

Experiments are under way (in collaboration with Dr. Howard C. Hopps) to find the therapeutic effect of the modified plasma on experimental shock. A normal dog given, while under ether anesthesia, 500 cc of the substance containing 5 per cent. protein showed no change in respiration and a slight rise in blood pressure apparently due to increased blood volume. Allowed to recover, this animal disclosed no untoward effect which might be attributed to the infusion. Dogs brought into shock by massive bleedings have been successively treated by infusion with the modified plasma. Their blood pressure is readily restored and they survive what otherwise would have been fatal shock. An animal used a second time in such an experiment, three weeks after the first experiment, likewise recovered and showed no effect that could be ascribed to a sensitization from the previous infusion.

It is generally believed that the loss of antigenicity which a protein undergoes when treated with strong alkali is due to racemization. The changes produced in beef plasma described above are apparently *not* due to racemization for the following reasons: (1) with complete racemization optical rotation is brought to an irreducible minimum. The optical rotation of modified beef plasma after one hour of treatment with 0.5 normal sodium hydroxide is but slightly altered; (2) with complete racemization the treated protein is no longer digestible by proteolytic enzymes or putrefactive bacteria. Modified beef plasma is readily digested by pepsin and becomes putrefied on standing exposed.

The cause of the loss of antigenicity from short exposure to alkali is not yet fully determined. During neutralization of the alkaline plasma a very strong odor of hydrogen sulfide is given off. This suggests the destruction of cystine and other sulfur-containing amino acids. It is possible that other amino acids, including those that are believed to be necessary for antigenicity of proteins, are also destroyed. If this be true the modified beef plasma may be considered analogous to gelatin which is produced by hydrolysis of collagen. Gelatin is deficient in certain amino acids, a fact which has been related to its lack of antigenicity.

JULIAN H. LEWIS

BOOKS RECEIVED

COONAN, FREDERICK L. *Principles of Physical Metallurgy.* Illustrated. Pp. xi + 238. Harper and Brothers. $3.25.

CRAIK, K. J. W. *The Nature of Explanation.* Pp. 123. Macmillan Company. $1.50.

CUMMINS, HAROLD and CHARLES MIDLO. *Finger Prints, Palms and Soles.* Illustrated. Pp. xi + 309. Blakiston Company. $4.00.

FRAPRIE, FRANK R. and FRANKLIN I. JORDAN. *The American Annual of Photography.* Illustrated. Pp. 243. American Photographic Publishing Co. $1.50.

GLASS, BENTLEY. *Genes and the Man.* Illustrated. Pp. xii + 386. Bureau of Publications, Teachers College, Columbia University. $3.50.

KOLMER, JOHN A. *Clinical Diagnosis by Laboratory Examinations.* Illustrated. Pp. xlii + 1239. D. Appleton-Century.

PRAY, LEON L. *Taxidermy.* Illustrated. Pp. viii + 91. Macmillan Company. $1.49.

TOMKINS, SILVAN S. *Contemporary Psychopathology.* Illustrated. Pp. xiv + 600. Harvard University Press. $5.00.

TURNER, C. E. *Personal and Community Health.* Illustrated. Pp. 585. C. V. Mosby Company. $3.50.

ZMESKAL, OTTO. *Radiographic Inspection of Metals.* Illustrated. Pp. x + 150. Harper and Brothers. $2.75.