ABSTRACTS

DEPARTMENT OF PHYSICS

1. THERMAL EXPANSION OF CÆSIUM BROMIDE. R. S. Krisnnan and R. Srinivasan, *Proc. Phys. Soc.*, 1956, **69 B**, 679.

The thermal expansion of cæsium bromide has been measured from — 139° C. to 300° C. The expansion coefficient varies with temperature throughout the whole range according to the following equation:

$$(46{\cdot}60 + 4{\cdot}67 \times 10^{-2}\, t - 1{\cdot}78 \times 10^{-5}\, t^2) \times 10^{-6}$$

2. INFRARED INVESTIGATIONS ON THE HYDROCARBON CYPERENE—II. P. T. Narasimhan and Radomir Senitch, *Proc. Ind. Acad. Sci.*, 1956, **43 A**, 156.

The infrared spectra of cyperene II, dihydrocyperene II and tetrahydrocyperene II have been studied in the form of thin liquid films in the region 800–3,500 cm.$^{-1}$ The skeletal structure of these molecules is of the eudalene type. The probable structures of these molecules are discussed in the light of the infrared data and tentative assignments have been made.

3. STRESS-OPTIC DISPERSION IN GLASSES. S. Ramaseshan and V. Sivaramakrishnan. *Curr. Sci.*, 1956, **25**, 246.

This communication presents the phenomenological theory of stress-optic dispersion and develops a formula for the same. The data for fused silica and those obtained for a typical light glass have been used to verify the essential features of the theory.

4. FARADAY ROTATION IN CALCITE. S. Ramaseshan and V. Sivaramakrishnan, *Proc. Ind. Acad. Sci.*, 1956, **44 A**, 201.

The Faraday rotation has been measured in calcite for the wavelengths λ 5893, λ 5461, λ 4047. A dispersion formula for the magneto-optic rotation has been fitted up using the same absorption frequencies that are used in refractive dispersion.

5. DISPERSION OF FARADAY ROTATION IN FUSED QUARTZ. V. Sivaramakrishnan, *Proc. Ind. Acad. Sci.*, 1956, **44 A**, 208.

The complete experimental set-up of an accurate photoelectric polarimeter with an ultraviolet sensitive photomultiplier, a tuned amplifier followed by a cathode-ray oscillograph has been described in this paper. This has been used for measuring Faraday rotation in a perfect fused quartz specimen showing no residual birefringence.

6. MAGNETO-OPTIC STUDIES IN THE NITRATES OF LEAD, BARIUM AND STRONTIUM. V. Sivaramakrishnan, *Proc. Ind. Acad. Sci.*, 1956, **44 A**, 216.

The Verdet constants have been determined for the nitrates of lead, barium and strontium from λ 5780 to λ 3650. Dispersion formulæ have been constructed for both optical refraction and magneto-optic rotation using the same absorption frequencies in both.

7. COMPARISON AND EVALUATION OF THE ABSOLUTE VALUES OF PARAMAGNETIC RESONANCE ABSORPTION IN SOME POWDERS. Miss K. Sundaramma, *Proc. Ind. Acad. Sci.*, November 1956, **44** A, 345.

By the simple method of measuring the absorption of mixtures of the powders of copper sulphate pentahydrate, chrome alum and cupric ammonium oxalate dihydrate with manganous sulphate monohydrate, their paramagnetic resonance absorptions have been compared with that of manganous sulphate monohydrate.

DEPARTMENT OF BIOCHEMISTRY

1. CHROMATOGRAPHY

1. PERCHLORIC ACID AS A REAGENT FOR TRYPTOPHAN, TYROSINE AND HYDROXY-PROLINE IN PAPER CHROMATOGRAPHY. K. V. Giri, *Naturwissenschaften*, 1956, **43**, 1.

The reaction suggested by Tanber has been made use of with slight alteration in the concentration of perchloric acid. It has been successfully employed for the identification of tryptophan, tyrosine and hydroxyproline in circular chromatograms.

2. CIRCULAR PAPER CHROMATOGRAPHIC METHOD FOR THE ESTIMATION OF THIAMINE AND RIBOFLAVIN IN MULTIVITAMIN PREPARATIONS. K. V. Giri and S. Balakrishnan, *Anal. Chem.*, 1955, **27**, 1178.

A simple and elegant method for estimating the two vitamins in multivitamin preparations has been outlined.

3. APPLICATION OF CIRCULAR PAPER CHROMATOGRAPHIC METHOD FOR THE DETECTION OF ADULTERATION OF MILK. B. V. Ramachandra, N. N. Dastur and K. V. Giri, *Indian J. Dairy Sci.*, 1955, **8**, 83.

By means of the above technique, it has been shown that the adulteration and quality of milk can be determined by the estimation of lactose.

2. CLINICAL BIOCHEMISTRY

4. A BLOOD ANTICOAGULANT FACTOR FROM THE LATEX OF *Carica papaya*. PART I. PURIFICATION AND GENERAL PROPERTIES. N. C. Pillai, C. S. Vaidyanathan and K. V. Giri, *Proc. Ind. Acad. Sci.*, 1955, **42**, 316.

A factor capable of effectively inhibiting the process of coagulation of plasma as well as whole blood has been obtained in a fairly pure state from the latex of *Carica papaya*. The factor was found to be heat stable and antitryptic.

5. A BLOOD ANTICOAGULANT FACTOR FROM THE LATEX OF *Carica papaya*. PART II. ITS NATURE OF ACTION IN BLOOD COAGULATION. N. C. Pillai, C. S. Vaidyanathan and K. V. Giri. *Proc. Ind. Acad. Sci.*, 1956, **43**, 46.

The anticoagulant factor isolated from papaya latex acts both as an antiprothrombin and an antithrombin. The antithrombic activity of the factor was partially destroyed by iodacetate treatment.

6. AGAR ELECTROPHORESIS OF HEMOGLOBINS. K. V. Giri and N. C. Pillai, *Curr. Sci.*, 1956, **25**, 188.

Sickle cell hemoglobin (S) from an aboriginal tribe of Nilgiris, has been separated from adult hemoglobin (A) by the agar electrophoretic technique. Two hemoglobins (α and β) have been detected in the chicken blood hemolysates by employing agar electrophoresis.

7. MULTIPLE HEMOGLOBINS IN THE BLOOD OF ANIMALS. K. V. Giri and N. C. Pillai, *Nature* (London), 1956, **178**, 1057.

Blood samples from about ten animal species had been studied electrophoretically. Buffalo blood showed the presence of two hemoglobins, rat blood indicated the presence of one major and two minor components. Other animals had only one hemoglobin, but the hemoglobins showed variation in their electrophoretic mobilities.

3. CYTOGENETICS

8. STUDIES ON A RIBOFLAVIN EXCRETING YEAST. PART II. REQUIREMENTS OF MINERAL CONSTITUENTS. K. K. Mitra, *J. Sci. Ind. Res.*, 1955, **14 C**, 21–23.

The qualitative needs of the riboflavin excreting mutant yeast, BY 2, with respect to basic mineral constituents have been evaluated. K^{++}, Mg^{++}, SO_4^{--}, and PO_4^{---} ions are indispensable for the growth of the yeast and Ca^{++} serves as an accessory growth factor. Absence of SO_4^{--} ion in the medium markedly decreases the production of riboflavin. The presence of iron in the medium increases the production of riboflavin by the yeast, the optimum concentration being 4–5 μg of iron per 100 c.c. of the medium.

9. STUDIES ON THE CYTOLOGY OF YEASTS. PART XI. MITOSIS IN AN UNMODIFIED DIPLOID ISOLATED AFTER LONG TREATMENT WITH CAMPHOR. S. K. Sreepathi Rao, *Cytologia*, 1955, **20**, 52–61.

The cytological behaviour of a diploid isolated after exposure of the control yeast, BY 1, to camphor for 90 days is described. The recovered diploid is indistinguishable in its behaviour from the parent yeast. As in the control there is no synchronization in (*a*) the reproduction of the chromosomes, (*b*) the separation of the chromatids and (*c*) the onset of the telophasic changes. Karyokinesis and cytokinesis also do not parallel each other. Rare precocious anaphases are illustrated.

10. THE NUCLEUS IN THE LIVING YEAST. S. Royan and M. K. Subramaniam, *Proc. Ind. Acad. Sci.*, 1956, **43 B**, 228–32.

There appears to be a large measure of agreement regarding the identification of the homogeneous body in the yeast cell as the nucleus. The differences relate only to the nuclear nature of the vacuole. In a 120-hour culture of a strain of *S. cerevisiæ*, the appearance of the nucleus and vacuole under ordinary, phase contrast and dark ground illumination is described. Each appears to possess a membrane delimiting it from the cytoplasm. Can it be that yeast is bi-nucleate?

11. SOME CYTOPLASMIC DETAILS OF YEAST REVEALED BY THE ELECTRON MICROSCOPE. S. Royan and D. L. Bhattacharya, *Curr. Sci.*, 1956, **25**, 155–56.

Young cells from wort cultures of BY 2 fixed in 40% neutral formaldehyde for 1 hour and stored in 5% formaldehyde for 3 days were washed for 3 hours in repeated changes of distilled water and hydrolysed in N HCl at 60° C. for 12–15 minutes. There is a progressive removal of opacity to electron beams on hydrolysis. A spherical electron opaque body reminding one of the nuclei of stained preparations is illustrated.

12. THE TONOPLAST IN YEAST. N. V. Aswathanarayana, *Curr. Sci.*, 1956, **25**, 88–89.

In aging cultures the vacuole has a luminous contour. It has to be surmised that there is a formed membrane delimiting the vacuole from the cytoplasm. Can the vacuolar membrane of yeast be considered homologous to the tonoplast of plant cells?

13. THE VACUOLE IN YEAST. N. V. Aswathanarayana, *Proc. Ind. Acad. Sci.*, 1956, **43 B**, 314–324.

The vacuole was studied under ordinary, phase contrast and dark ground illumination in yeast of varying ages. With the increasing age of the culture almost all cells appear vacuolated and more and more cells exhibit luminous contours to their vacuoles. On transfer to fresh media the vacuoles and grains disappear from view and the cytoplasm looks homogeneous. During such a phase in its growth cycle, yeast appears comparable to meristematic cells. During the process of aging, the cells exhibit granules and vacuoles and the vacuole comes to possess a membrane, delimiting it from the cytoplasm and sometimes a dancing body inside. Can these changes be considered as an example of differentiation-in-time in yeast?

4. ELECTROPHORESIS

14. ZONE ELECTROPHORESIS OF SERUM PROTEIN. K. V. Giri, *Naturwissenschaften*, 1956, **43**, 36.

A technique of agar electrophoresis has been described. The value of the method in clinical diagnosis has been indicated. Electrophoretic patterns of serum samples in health and certain diseases have been presented.

5. Enzymes

15. Synthesis of Oligosaccharides from Maltose by Rat Liver. K. V. Giri, A. Nagabhushanam, V. N. Nigam and B. Belavadi, *Science*, 1955, **121**, 898.

Rat liver and brain contain an enzyme which synthesise oligosaccharides containing 1 : 4 glucosidic linkages from maltose.

16. Transglucosidation in Penicillin Chrysogenum Q-176. K. Saroja, R. Venkataraman and K. V. Giri, *Biochem. J.*, 1955, **60**, 399.

By means of charcoal chromatography, four components, isomaltose, isomaltotriose, panose and 4-α-isomaltotriosyl-D-glucose, and a group of higher oligosaccharides were found to be formed by a transglucosidase from *Penicillium chrysogenum*.

17. The Amino Acid Metabolism of *Aspergillus flavus*. N. C. Pillai and K. S. Srinivasan, *J. General Microbiol.*, 1956, **14**, 248.

A complete quantitative amino acid analysis of the free amino acid fraction and the mycelial residue fraction of *A. flavus* during different stages of growth has been made by circular paper chromatographic technqiue. An analysis of the culture fluid also has been accomplished and the changes observed in the various fractions during the period of incubation discussed.

18. Transferases Synthesising Oligosaccharides. K. V. Giri, *Soc. Biol. Chem.*, India, *Souvenir*, 1955, **1**,

A review of the recent investigations carried out in the Department of Biochemistry, Indian Institute of Science, on the synthesis of oligosaccharides from disaccharides by the moulds *Penicillium chrysogenum*, Q-176 and *Aspergillus flavus*.

6. Food and Nutrition

19. Effect of Blocking the Reticulo-Endothelial System on the Storage of Vitamin A Ester and Alcohol in the Liver of the Rat. S. Krishna Murthy and J. Ganguly, *Nature*, 1956, **177**, 575.

Blocking of Kupffer cells resulted in lowering the concentration of vitamin A ester in liver and increasing the level of this form of vitamin A in blood and the vitamin A alcohol values in blood and liver were unchanged.

20. Vitamins. S. Krishna Murthy and J. Ganguly, *Annual Review of Biochemical and Allied Research in India*, 1955, **25**, 36.

A review of the work done in India on vitamins during the year 1954.

21. Spectrophotometric Determination of Vitamin A in Indian Marine Fish Liver Oils. S. Balasundaram, H. R. Cama, P. R. Sundaresan and T. N. R. Varma, *J. Sci. Ind. Res.*, 1956, **15 C**, 23.

The observations suggest the necessity for taking the vitamin A_2 potency into consideration when assessing the overall vitamin A value of fish liver oils. About 10% of the total vitamin A exists as vitamin A_2.

22. NUTRITIVE VALUE OF HEATED VEGETABLE OILS. N. V. Raju and R. Rajagopalan, *Nature*, 1955, **176**, 513.

Vegetable oils heated to a high temperature (270° C.) for 8 hours adversely affected the gain in weight of rats. Liver fats of the rats receiving heated oils were considerably higher than the control group of rats.

23. THIAMINE NUTRITION STATUS OF HUMAN SUBJECTS RECEIVING SUPPLEMENTS OF CURDS. S. Balakrishnan and R. Rajagopalan, *Indian J. Med. Res.*, 1955, **43**, 559.

Judged from increase in body weight, urinary and fæcal thiamine excretion, levels of pyruvic and lactic acids in blood and blood thiamine levels, it was found that curds led to better thiamine status through increased synthesis of the vitamin.

7. SANITATION BIOCHEMISTRY

24. INVESTIGATIONS ON SEWAGE FARMING: REPORT OF RECENT WORK ON THE PRINCIPLES OF SEWAGE PURIFICATION AND SEWAGE FARMING. S. C. Pillai, *Indian Council of Agricultural Research*, 1955, pp. 85 (with 94 figures).

In this Report, which is in continuation of the earlier Reports on the subject, an account is given of the work done in the Department of Biochemistry during 1950–55 on the biochemical changes in sewage under different conditions, on the biological principle of purification of sewage-polluted waters and sewaged soils, on the natural purification of flowing sewage and on related aspects. Evidence is presented on the sanitary importance of certain protozoa, particularly Vorticellids, and on their vital role in the biological oxidation of sewage which may be utilised for increased production of fodder and fish.

25. THE PRINCIPLE OF THE ACTIVATED SLUDGE PROCESS. S. C. Pillai and R. Rajagopalan, *Soc. Biol. Chemists*, India, *Souvenir*, 1955, pp. 241–47.

The development of the activated sludge process, the various theories of the process and the evidence accumulating at Bangalore on the biological mechanism of the process are briefly reviewed.

26. INFLUENCE OF DIET ON FLUOROSIS IN RATS. S. C. Pillai and T. K. Wadhwani, *Surgical & Medical News*, 1956, **2**, pp. 28–37.

Experiments with rats showed that diets rich in calcium and phosphorus had a considerable beneficial influence on fluorine intoxication in the animals, and that this influence seemed to depend upon the amount and availability of the calcium and phosphorus in the diet. Bone meal as also leaves and grasses rich in calcium and phosphorus may be used for supplementing the diets of farm animals in the areas where fluorosis is endemic.

MISCELLANEOUS

27. THE ACTION OF HYDROGEN PEROXIDE ON AMINO ACIDS IN PRESENCE OF IRON SALTS AND ITS BEARING ON PHOTOLYSIS OF AMINO ACIDS. G. D. Kalyankar, C. S. Vaidyanathan and K. V. Giri. *Experientia*, 1955, **11**, 9, 348.

The changes undergone by amino acids by the action of hydrogen peroxide have been studied in detail and compared with photo-oxidation of the amino acids.

28. STABILISATION OF NITROGEN—AN ASPECT OF MANURING OF ALKALINE COTTON SOILS. S. Balasundaram, K. S. Srinivasan and K. V. Giri. *Indian Cotton Growing Review*, 1955, **9**, 3.

Addition of carbohydrate materials to soil reduced loss of ammonia from added fertilisers. Absorption of ammonia by these materials and rapid conversion of ammonia to proteins by bacteria appear to be the mechanism of action of these materials.

FERMENTATION TECHNOLOGY LABRATORY

1. MICROBIAL DECOMPOSITION OF OXALATE. J. V. Bhat and S. R. Khambata. *Silver Jubilee Souvenir. Society of Biological Chemists (India)*, 1956, 186–90.

In this review article is assembled for the first time the scattered information made available on the subject of oxalate decomposition by bacteria during the past decade, a period marked for the recrudescence of interest on the topic. By experimenting on two strains of *Pseudomonas oxalaticus* which can grow at 27° C as well as 37 °C the authors have furnished evidence to show for the failure of organisms to decompose oxalate at the higher temperature and explained the reason for the failure met with in isolating the organism in enrichments at 37° C.

2. PYRUVATE REACTIONS IN THE CARBOHYDRATE METABOLISM OF BACTERIA. J. V. Bhat, *Proceedings of the Society of Biological Chemists (India)*, 1956, **15**, 18–23.

Pyruvate which ranks as the foremost intermediate in the cellular metabolism of bacteria has been shown in the article to undergo a variety of transformations under the influence of bacterial enzymes to form (1) amino acids, (2) lactate, (3) lactate, acetate and carbon dioxide, (4) oxalacetate or malate, (5) acetate and formate, (6) acetate and carbon dioxide, (7) acetaldehyde and carbon dioxide, (8) acetyl lactate and acetoin, (9) acetyl acetoin, diacetyl acetoin and acetyl butanediol and (10) fats.

3. GENERAL MICROBIOLOGY INCLUDING ANTIBIOTICS. J. V. Bhat and V. Iyer, *Biochemical and Allied Research in India*, 1955, **26**, 40–51.

This article represents a critical review of the work reported by workers in India on the subject of microbiology and antibiotics during the year 1955.

4. HEAT RESISTANCE OF AEROBIC BACTERIAL SPORES. V. Iyer and J. V. Bhat, *Fruit and Vegetable Preservation Industry in India, Central Food Technological Research Institute*, Mysore, 1956, 180–84.

Investigations on the intrinsic thermal resistance of different strains and species of the genus *Bacillus* were conducted. Many of the strains examined showed remarkable resistance, comparable to that exhibited by test organisms such as *Cl. botulinum* or P. A. 3679. Stress is laid on the importance of using a sufficient number of replicates and of defining the exact conditions under which reliable resistance data are gathered. It is pointed out that results are best presented and interpreted on the basis of chances of survival rather than as absolute destruction points. It is mentioned that an observed correlation between maximum growth temperature and thermal resistance suggests the probable existence of even more resistant strains among the facultative and obligate thermophiles. A plea is made for intensive study of the heat resistance of this group which causes frequent spoilage of low-acid canned foods.

5. ROLE OF SAFFRON, NUTMEG AND OTHER ADDITIVES IN FOODS. V. Iyer, Rajul Broker, Maya G. Bhat and J. V. Bhat, *Fruit and Vegetable Preservation Industry in India, Central Food Technological Research Institute*, Mysore, 1956, 214–17.

Additives have been looked upon as food adjuncts or accessories having but a meagre role in nutrition and useful only in flavouring otherwise bland foods. Recent studies have, however, shown their importance in nutrition and their effect on digestion.

Saffron, nutmeg and asafœtida, three of the popularly used additives in Indian homes, were tested by specially designed methods. Whereas saffron and nutmeg were found to prolong the generation time of spore-forming bacteria, asafœtida did not appear to possess any ' preservative ' action. Saffron activated pancreatic amylase in its digestion of starch but its effect on proteolytic and lipolytic enzymes was negligible. Nutmeg proved to be generally depressing whereas asafœtida appeared not to exert much influence on the digestive enzymes.

1827–56. Printed at The Bangalore Press, Bangalore City, by C. Vasudeva Rao, Superintendent.