ABSTRACTS

DEPARTMENT OF PHYSICS

1. THEORY OF OPTICAL ACTIVITY OF CRYSTALS. I. GENERAL IDEAS. G. N. Ramachandran, *Proc. Ind. Acad. Sci.*, **33 A**, 217–27.

The paper contains a classical description of the first order terms in the polarisability theory of optical activity. Optical activity essentially arises because the dipoles induced by the light wave in the medium are not all in the same phase. As a result of their mutual influences, the resultant induced moment will not be in phase with the electric field of the light wave and would lead to a rotation (ρ). By comparing the results calculated from the structure with the phenomenological theory of light propagation in the crystal, the magnitude of ρ is obtained. This method has been applied to a hypothetical tetragonal crystal having a spiral structure. It leads to the interesting result that the rotation at right angles to the optic axis is opposite in sign to that along the axis, as in quartz. The theory also predicts that, in general, the rotation will vary faster than $1/\lambda^2$, as is found to be the case with many substances.

2. RAMAN SPECTRUM OF LITHIUM AMMONIUM TARTRATE MONOHYDRATE. C. Shanta Kumari, *Proc. Ind. Acad. Sci.*, **33 A**, 236–39.

Using $\lambda 2537$ resonance radiation as exciter, the Raman spectrum of a single crystal of lithium ammonium tartrate has been recorded for the first time. The spectrum exhibits thirty-seven Raman lines. The observed frequency shifts are compared with those of other tartrates. The frequencies due to the NH_4 ion are seen to be very much suppressed in the spectrum of this crystal.

A few of the Raman lines show marked variations in intensity with orientation of the crystal.

3. RAMAN SPECTRUM OF POTASSIUM DI-HYDROGEN PHOSPHATE. P. S. Narayanan, *Proc. Ind. Acad. Sci.*, **33 A**, 240–44.

The Raman spectrum of potassium di-hydrogen phosphate has been studied using the $\lambda 2537$ radiation of a quartz mercury arc. It consists of 15 lines of which 10 are due to internal oscillations of the H_2PO_4 groups, 2 rotatory oscillations of the H_2PO_4 groups and 3 translatory type of external oscillations. Following Jean Chapelle, an approximate calculation of the frequencies of translatory type of oscillations has been made and compared with those observed.

4. THERMAL EXPANSION OF CRYSTALS. PART VI. ALUMINA. S. S. Sharma, *Proc. Ind. Acad. Sci.*, **33** A, 245–49.

The paper describes the results of interferometric study of thermal expansion of alumina along and perpendicular to the optic axis. The principal coefficients of expansion are given by

$$\alpha_{||} = 0 \cdot 0_5 6582 + 0 \cdot 0_8 4995 \ t + 0 \cdot 0_{11} 2578 \ t^2.$$
$$\alpha_{\perp} = 0 \cdot 0_5 5425 + 0 \cdot 0_8 5534 \ t + 0 \cdot 0_{11} 2876 \ t^2.$$

It is found that the anisotropy in thermal expansion is closely related to the anisotropy in the principal elastic modulus.

5. THERMAL EXPANSION OF CRYSTALS. PART VII. BARITE. S. S. Sharma. *Proc. Ind. Acad. Sci.*, **33** A, 283–89.

The paper describes the results of study of the thermal expansion of barite and its directional dependence. The principal coefficients of linear expansion along the crystallographic axes are given by

$$\alpha_a = 0 \cdot 0_4 1362 + 0 \cdot 0_7 1298 \ t + 0 \cdot 0_{10} 1192 \ t^2$$
$$\alpha_b = 0 \cdot 0_4 2395 + 0 \cdot 0_7 1256 \ t + 0 \cdot 0_{10} 1368 \ t^2$$
$$\alpha_c = 0 \cdot 0_4 1407 + 0 \cdot 0_7 1520 \ t + 0 \cdot 0_{10} 1102 \ t^2$$

6. THE THEORY OF OPTICAL ACTIVITY OF CRYSTALS. II. CALCUALTION OF THE ROTATORY POWER OF NaClO₃ AND NaBrO₃. G. N. Ramachandran, *Proc. Ind. Acad. Sci.*, **33** A, 309–15.

The theory of optical activity outlined in Part I has been applied to the cases of NaClO₃ and NaBrO₃. The calculated values for the rotatory power agree reasonably well with measurements previously reported.

7. RAMAN SPECTRUM OF CANE-SUGAR CRYSTAL. Roop Kishore and V. M. Padmanabhan, *Proc. Ind. Acad. Sci.*, **33** A, 360–63.

Using λ 2537 mercury resonance radiation as exciter, the Raman spectrum of cane-sugar crystal has been investigated. The recorded spectrum exhibits sixty-three Raman lines. Of these, the two intense Raman lines with frequency shifts 79 and 94 cm.$^{-1}$ which are absent in the spectra of crystal of α- and β-glucose have been attributed to the mutual oscillations of the glucose and fructose units constituting the cane-sugar molecule. The C-H oscillations give rise to a group of ten closely spaced Raman lines.

8. THE DISTRIBUTION OF INTENSITY IN THE RAMAN SPECTRUM OF DIAMOND. P. S. Narayanan, *Proc. Ind. Acad. Sci.*, **34** A, 1–13.

From microphotometric studies of the Raman spectrum of diamond, the distribution of intensity in it has been derived. The spectra themselves

exhibit much observable fine structure, including several sharply-defined and intense lines. The intensity curve also exhibits steep drops to zero near the frequency shifts 2,176 and 2,665 cm.$^{-1}$ These facts are discussed and it is shown that the features mentioned, as also the appearance of second-order Raman spectra generally with crystals, are irreconcilable with the Born-Karman theory of lattice vibrations.

9. FARADAY EFFECT AND BIREFRINGENCE---I. S. Ramaseshan, *Proc. Ind. Acad. Sci.*, **34 A**, 32-40.

Approximate formulæ correlating the decrease in Faraday rotation with birefringence have been derived and these have been verified by experiments on strained glasses and plastics. It is found that for small values of birefringence, the decrease in the Faraday rotation is proportional to the square of the total birefringence. For values of the birefringence of $\lambda/30$, the decrease in the rotation is less than 1%. The Verdet constant in birefringent solids can be accurately determined provided sufficiently thin specimens are taken such that the total birefringence is small. Finally it is shown that the decrease in the Faraday rotation can itself be used as an accurate measure of the birefringence in strained solids.

10. THERMAL EXPANSION OF CRYSTALS. PART VIII. GALENA AND PYRITE. S. S. Sharma, *Proc. Ind. Acad. Sci.*, **34 A**, 72-76.

The results of study of thermal expansion for galena and pyrite in the range $(0-400)°$ C. are reported. It is found that the coefficients of linear expansion are respectively given by the formulæ

$$a_t = 0.0_4 1843 + 0.0_8 6071\ t + 0.0_{10} 1176\ t^2$$

and

$$\sigma_t = 0.0_5 8401 + 0.0_7 1125\ t + 0.0_{11} 9168\ t^2.$$

Gruneisen's constant has been evaluated and is found to vary with temperature.

11. FARADAY EFFECT AND BIREFRINGENCE. II. CORUNDUM. S. Ramaseshan, *Proc. Ind. Acad. Sci.*, **34 A**, 97-100.

The Verdet constant and the magneto-optic anomaly for corundum for light travelling along the optic axis have been determined for the wavelengths $\lambda\,5,893$, $\lambda\,5,461$ and $\lambda\,4,358$. The Verdet constant has the values $V_{5893} = 0.0210'$, $V_{5461} = 0.0240'$ and $V_{4358} = 0.0381'$ minutes per cm. per Oersted and γ has a value of 0.64. Accurate measurements have also been made for directions of propagation inclined to the optic axis and it is found that the Verdet constant does not sensibly change for an inclination of about $15°$ away from the optic axis,

12. THE THEORY OF OPTICAL ACTIVITY OF CRYSTALS. III. CALCULATION OF THE ROTATORY POWER OF β-QUARTZ. G. N. Ramachandran, *Proc. Ind. Acad. Sci.*, **34 A**, 127-35.

Using the general theory of Part I, the rotatory power of β-quartz along and perpendicular to the axis are calculated to be $236°$ and $115°$. These agree well with the value $252°$ observed for the former and the value 0.50 observed for the ratio of the two in α-quartz.

13. ANALYSIS OF THE RAMAN SPECTRA OF SODIUM AND POTASSIUM TARTRATES. V. M. Padmanabhan, *Proc. Ind. Acad. Sci.*, **34 A**, 155-60.

The polarisation characteristics of the light scattered by single crystals of sodium and potassium tartrates have been investigated using the mercury resonance radiation as exciter. The study revealed that the behaviour of the Raman lines in sodium tartrate and potassium tartrate satisfied the selection rules for the orthorhombic and monoclinic symmetry respectively.

14. PHOTOELASTIC PROPERTIES OF BARITE. K. Vedam, *Proc. Ind. Acad. Sci.*, **34 A**, 161-72.

All the 12 elasto-optic constants of barite have been determined and the values obtained for $\lambda 5893$ are

$p_{11} = 0.21$	$p_{41} = 0.002$	$p_{12} = 0.25$	$p_{23} = 0.19$
$p_{22} = 0.24$	$p_{55} = 0.012$	$p_{13} = 0.16$	$p_{31} = 0.275$
$p_{33} = 0.31$	$p_{66} = 0.037$	$p_{21} = 0.034$	$p_{32} = 0.22$

The behaviour of the optical properties of barite on uniform compression on all sides is discussed. The true temperature coefficients of the three principal refractive indices have also been calculated.

15. PHOTOELASTIC CONSTANTS OF SODIUM CHLORATE FROM ULTRASONIC DIFFRACTION. K. Vedam and G. N. Ramachandran, *Proc. Ind. Acad. Sci.*, **34 A**, 240-44.

Details are given of the theory and technique of measuring photoelastic constants in optically active cubic crystals from ultrasonic diffraction of light. The results thus obtained, in conjunction with the measurements of relative path retardation produced by stressing the crystal, enable one to obtain all the four constants independently.

16. PHOTOELASTIC CONSTANTS OF SODIUM CHLORATE. G. N. Ramachandran and V. Chandrasekharan, *Nature*, April 7, 1951, **167**, 567.

The photoelastic constants of sodium chlorate have been determined to be $p_{11} = 0.173$, $p_{12} = 0.258$, $p_{33} = 0.223$, $p_{44} = -0.0187$. This is the

first optically active cubic crystal to be so studied and so special techniques were developed for the purpose.

17. RAMAN SPECTRUM OF APOPHYLLITE. P. S. Narayanan, *Current Science,* 1951, **20**, 94-95.

The Raman spectrum of a natural specimen of apophyllite has been studied using $\lambda\,2537$ of mercury as exciter. 9 out of the 19 Raman lines observed have been assigned to the possible symmetry types of apophyllite on the basis of orientation and polarisation studies.

18. THE MAGNETO-OPTIC CONSTANTS OF SODIUM BROMIDE. S. Ramaseshan, *Current Science,* June 1951, **20**, 150.

The Verdet constant in sodium bromide is found to have values $0 \cdot 621'$ and $0 \cdot 123'$ per cm. per oersted for the two wave-lengths $\lambda\,5461$ and $\lambda\,4358$. The magneto-optic anomaly is between $0 \cdot 86$ and $0 \cdot 88$.

19. FARADAY EFFECT AND BIREFRINGENCE. S. Ramaseshan, *Curr. Sci.,* June 1951, **20**, 150-51.

Simple formulæ correlating the decrease in the magneto-optic rotation with the strain introduced in a transparent isotropic substance have been derived.

20. UNIT CELL AND SPACE GROUP OF BARIUM CHLORATE MONOHYDRATE. Gopinath Kartha, *Curr. Sci.,* June 1951, **20**, 151.

Barium chlorate is found to belong to the monoclinic space group C^6_{2h}, C $2/c$, with cell constants $a = 13 \cdot 3$ A, $b = 7 \cdot 8$ A, $c = 9 \cdot 35$ A and $\beta = 138° 15'$. Z the number of molecules per unit cell is 4.

21. SCATTERING OF LIGHT IN COLLOIDAL DYE SOLUTIONS. S. R. Sivarajan, *Curr. Sci.,* August 1951, **20**, 202-03.

A quantitative study of the intensity and depolarisation of light scattered by solutions of benzopurpurine 4 B and chrysophenine G reveals the existence of anisotropic micelles in solution, the size and shape of which are altered by temperature and the presence of foreign electrolytes.

DEPARTMENT OF BIOCHEMISTRY

1. THE TRYPTIC INHIBITOR AND THE AVAILABILITY OF CYSTINE AND METHIO-
NINE IN RAW AND GERMINATED SOYA BEANS. H. S. R. Desikachar
and S. S. De, *Biochemica et Biophysica Acta*, 1950, **5**, 285.

The utilisation of the nitrogen and sulphur of the proteins of raw and
germinated soya beans was determined by balance studies on rats. The
digestibility coefficient of the protein was $84 \cdot 6$ and $84 \cdot 3$ and the biological
value was $55 \cdot 3$ and $51 \cdot 3$ for the germinated and raw soya beans respectively.
The percentage absorption of total sulphur was $65 \cdot 2$ and $65 \cdot 1$ for the raw
and germinated beans respectively. The average percentage retention of
absorbed sulphur was slightly higher ($14 \cdot 5\%$) for the germinated bean than
for the raw bean ($10 \cdot 3\%$). Analysis of the urinary sulphur showed that the
rats excreted a proportionately larger amount of methionine sulphur on the
raw bean diet than when they were fed the germinated beans.

Analysis of the raw and germinated soya beans for their tryptic
inhibitor contents showed no difference in the tryptic inhibitor activity.

2. EFFECT OF THE PROTEOLYTIC INHIBITOR ON THE BIOLOGICAL VALUES AND
SUPPLEMENTARY VALUES OF DIFFERENT VARIETIES OF SOYA BEAN.
S. A. Rahaman and S. S. De, *Annals of Biochemistry and Experimental
Medicine*, 1950, **10**, Nos. 1–2.

The degree of inhibition of thirty varieties of soya beans, which were
grown under identical conditions, has been determined.

Supplementary values of four varieties of soya beans showing maximum
and minimum inhibition have been determined.

The supplementary and biological values of any variety of soya bean
is higher when its degree of inhibition is lower.

The wide difference in the supplementary and the biological values of
soya beans is due to the varying amounts of inhibitor they contain.

3. EFFECT OF PROTEOLYTIC INHIBITOR ON THE NUTRITIVE VALUE OF LEGU-
MINOUS PROTEINS, LIKE SOYA, VELVET AND NAVY BEANS. R. Raja-
gopalan, K. Subrahmanyan and S. S. De, *Science and Culture*, 1950,
15, 144.

It is now well established that soya bean contains a proteolytic inhibitor
and the association of this substance has been traced to be the main reason
for the low nutritive value of the raw bean,

Attempts were made, therefore, to study the biological value of soya bean and velvet and navy beans, which also contain the inhibitor, after removal of the inhibitor. In a similar manner, the supplementary effect of the inhibitor-free soya bean was also carried out. The results have clearly indicated that by acid extraction at a pH of 4·2, the inhibitor could be removed and the inhibitor-free soya bean possesses a considerably higher biological value than the raw bean. The results of the supplementary effect studies have substantiated the above results.

4. SOYA BEAN: ITS VARIED USES IN INDUSTRY AND IMPORTANCE IN HUMAN DIETARY. R. Rajagopalan and S. S. De, *Training Command Journal,* 1951, **4**, No. 2, 29.

A simple method of processing the bean into milk is outlined and the nutritive value of the milk is discussed. The preparation of some useful food products that could be obtained from residue left after the extraction of milk is outlined.

5. LIPASE FROM MOULDS GROWN ON OIL SEEDS. C. V. Ramakrishnan and B. N. Banerjee, *Science,* 1951, **113**, 125.

It has been shown that Lipase obtained from moulds grown on oilseeds has a better activity than that obtained from oilseeds. The optimum pH for the lipases obtained from moulds is 6·2. Groundnut cake is found to be the best medium for growing lipolytic moulds.

6. STUDIES ON ENZYME LIPASE. COMPARATIVE STUDY OF LIPASES FROM OILSEED CAKES. C. V. Ramakrishnan and B. N. Banerjee, *Jour. of Ind. Chem. Soc.,* 1950, **27**, No. 12.

Lipases are obtained from different oilseed cakes like ghani cake, propeller cake and pressed cake. It is found that the activity is low and decreases in the order pressed, ghani, propeller cake lipase. The optimum temperature for enzymic hydrolysis is 37°–40°. Organic salts like glycerine, ascorbic acid, etc., accelerate the lipase activity to a great extent.

7. STUDIES ON REFRACTIVE INDEX OF MILK FROM INDIAN COWS AND BUFFALOES. C. V. Ramakrishnan and B. N. Banerjee, *Science and Culture,* 1951, **17**, 176.

Milk samples have been collected from all parts of India and analysed for the specific gravity, refractive index, refractive constant, for pure unadulterated milk with a view to obtain standard values for use in distinguishing pure samples from adulterated samples,

8. STUDIES ON MOULD LIPASE. C. V. Ramakrishnan and B. N. Banerjee, *Research*, 1951, **4**, 389.

Lipase obtained from a strain of *Aspergillus niger* grown on castor seed has been studied. The lipolytic activity of the mold when grown on tne cake medium is very marked. The effect of different sugars and salts has been studied.

9. SYNTHESIS OF THIAMINE AND ASCORBIC ACID BY MOULDS GROWN ON COCOANUT. K. S. Srinivasan and C. V. Ramakrishnan, *Science and Culture*, Jan. 1951, **16**, 320–21.

The moulds grown on cocoanut have been isolated and grown in synthetic Czepeck's liquid medium. The synthesis of ascorbic acid and thiamine has been studied.

10. SYNTHESIS OF THIAMINE BY MOULDS. K. S. Srinivasan and C. V. Ramakrishnan, *Research*, 1951, **4**, 142.

Synthesis of thiamine by certain species of Aspergillus grown on oil-seeds has been studied. Groundnut cake is found to be a suitable material for growing moulds and to obtain the maximum amount of thiamine synthesised by the mould.

11. DETECTION OF ENZYMES BY THE AGAR-PLATE METHOD AND ITS APPLICATION TO PAPER CHROMATOGRAPHY. K. V. Giri and A. L. N. Prasad, *Nature*, London, 1951, **167**, 859.

The agar-plate method for the detection of enzymes, developed before in this laboratory, has been applied to the study of the movement of amylases (β-amylase from sweet potato and amylase from *Aspergillus niger*) on paper, using aqueous alcohol (50%) and aqueous acetone (50%) as solvent systems. The R_f values decrease with increase of the distance travelled by the solvent front.

12. SCREENING EFFECT OF VITAMIN C ON THE INACTIVATION OF LEAF PHOSPHATASE BY ULTRAVIOLET LIGHT. R. Das and K. V. Giri, *Science*, New York, 1951.

The nature of the protective action of Vitamin C against the inactivation of enzymes by ultraviolet light has been investigated. It has been shown that Vitamin C solution serves as a filter, absorbing the rays destructive to the enzyme, leaf phosphatase, thereby protecting the enzyme from inactivation by ultraviolet light.

13. GROUNDNUT AS RAW MATERIAL FOR FOOD INDUSTRIES. K. V. Giri, *The Oils and Oilseeds Journal*, 1951, **4**, 16.

Recent developments which have influenced the knowledge of the uses and applications of groundnut as raw material for the manufacture of food products for huamn consumption, have been indicated. The following aspects of the manufacture of food products in which groundnut is used as raw material have been discussed:

>1. Groundnut butter and milk;
>2. Synthetic grains;
>3. Predigested protein food from groundnut;
>4. Vitamin enriched groundnut.

14. PREPARATION OF *Iso*-MORELLIN. P. L. Narasimha Rao, S. C. L. Verma and D. V. Krishnamurthy, *Current Science*, 1951, **20**, 234.

It has been shown that by refluxing morellin in dry pyridine for 6 hours and crystallising the product from alcohol, *iso*-morellin could be obtained in about 50% yield. This is a marked advance on the previous procedures in which only a maximum yield of 6% was obtainable.

15. THE ANTIBIOTIC PRINCIPLES OF *Garcinia morella*—I. P. L. Narasimha Rao and S. C. L. Verma, *Jour. of Sci. & Ind. Res.*, 1951, **10B**, 184.

Morellin, the orange-yellow pigment from the seeds of *Garcinia morella* (Mysore Gamboge tree) has been fractionated to give morellins T, M and L by chromatographic separation on a silica gel adsorbent column.

Morellin-L exhibits low activity against *Micrococcus pyogenes* while the others are highly bacteriostatic to the organism. The morellins possess low activity against organisms of the enteric group; morellin-T, however, is active again against *Aerobacter aerogenes*.

16. INFLUENCE OF ANTIBIOTICS ON THE GROWTH OF THE SILKWORM, *Bombryx Mori*. M. R. Venkatachala Murthy, B. S. Shankarappa and M. Sreenivasaya, *Curr. Sci.*, 1951, **20**, 269–70.

In the course of some studies on the nutrition of the silkworm, the authors were confronted with the problem of intestinal infections among the silkworms. This was avoided by incorporating penicillin and strepto-mycin in the diet of silkworms which in this case normally consists of mulberry leaves supplemented with protein hydrolysates. Larvæ of the Mysore × Japanese cross-breed were employed in these experiments. The data presented show there was 2·5 to 6·8% increase in the body weight

2. Synthetic grains;
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of the larvæ fed on diets supplemented with antibiotics. Further, higher percentages of silk are obtained from the cocoons spun by such worms.

17. Ultra-Micro Papyrography. D. S. Venkatesh and M. Sreenivasaya, *Curr. Sci.*, 1951, **20**, 156–57.

A method has been developed by which ultra-micro qualities of antibiotics could be detected and estimated. Sewing threads of cotton were substituted for strips of filter-paper. After successive treatments with benzene, hot water and taka-diastase, the threads were washed with water, alcohol and finally with ether. Later on, they were impregnated with M/15 phosphate buffer (pH 6·2) and air-dried. The method could be successfully adapted for both 'ascending' and 'descending' techniques. The successful employment of the above method for the partitioning of penicillin in fermented beer is especially stressed. The method is also convenient for the assays of vitamins and other active principles.

18. Papyrographic Studies on the Degradation Products of Nucleic Acids. B. Bheemeswar and M. Sreenivasaya, *Curr. Sci.*, 1951, **20**, 61–62.

The papyrographic method was applied to a study of purines, pyrimidines and nucleotides, the essential degradation products of nucleic acids. The relative merits of several solvent systems were compared. The solvents employed in the present study were (1) 2:1 Ethanol—0·5 N HCl; (2) Ethanol in ammonia atmosphere; (3) 2:1 Propanol—0·5 N HCl; (4) Propanol in ammonia atmosphere; (5) Butanol—5% aqueous urea; (6) *Iso*-amyl alcohol—ammonium citrate: and (7) *Iso*-butyric acid—ammonium *iso*-butyrate at pH 3·6–3·7. Papyrograms developed in about 4 hours at room temperatures. Ultra-violet radiation was used for printing. The R_f values were determined in the usual way. It was found that among the various solvent mixtures employed, ethyl alcohol 0·5 N HCl (2:1) was advantageous over others in that better and more discrete separation of the constituents of nucleic acids were obtained. N-propanol-HCl (2:1) was also found to be equally good. The nucleotides could be conveniently separated using *iso*-butyric-ammonium *iso*-butyrate solvent system.

19. A Modified Autobiographic Technique for the Location of 'Physiologically Active' Spots on Papyrograms. D. S. Venkatesh and M. Sreenivasaya, *Curr. Sci.*, 1951, **20**, 98–99.

The bio-autographic technique has been employed for the location of 'physiologically active' spots on papyrograms. Stainless steel dishes

(40 cm. × 10 cm. × 2 cm.) were used. The " active " spots were clearly and easily located on the agar surface. The method is stated to be very successful in the characterisation and quantitative estimation of penicillin in fermented beer, and in the identification of growth factors in tissue fluids.

20. PAPYROGRAPHIC MICROMETHOD FOR THE STUDY OF ORGANIC ACIDS IN PLANTS. V. S. Govindarajan and M. Sreenivasaya, *Curr. Sci.*, 1951, **20**, 43–44.

The acid-alcohol extracts of mature leaves of Tamarind, *Tamarindus indica* Linn. and leaves and stems of *Oxalis carniculata* were analysed papyrographically for the presence of organic acid. The papyrograms of leaves of Tamarind revealed tartaric acid, and quite an appreciable amount of the maleic acid. Citric acid was not found. In the case of leaf and stem extracts of *Oxalis carniculata*, large amounts of tartaric acid and a small quantity of citric acid were found. Further, the extract of stem of *Oxalis* revealed maleic acid and another unidentified acid.

21. ON THE BIOLOGICAL OXIDATION OF SEWAGE. S. C. Pillai, *Curr. Sci.*, 1951, **20**, 75.

In continuation of earlier studies on sewage oxidations, it was observed that the biochemical changes in sewage after filtration through soil, in " diluted " and in " weak " sewages were essentially the same, although the rapidity of the changes was dependent on the amount of oxygen in the medium. The same types of micro-organisms (aerobic bacteria, protozoa such as the species of *Epistylis*, *Opercularia* and *Carchesium*, and higher forms of life such as *Aulophorus* sp. and Rotifers) were found to develop during successive replacements of the soil filtrates, diluted and weak sewages exposed in shallow basins, as in raw sewages intensively aerated by artificial means, *e.g.*, the activated sludge process. The observation on the development of *Opercularia* sp. in these media is of further interest as there seems to be no record about this organism in the literature bearing on protozoa in Indian waters, soils and sewages.

22. DEWATERING AND DRYING OF ACTIVATED SLUDGE. S. C. Pillai, *Science and Culture*, 1951, **16**, 478–80.

The efficiency of the filter mat (made of cocoanut fibre, patented by Dr. G. J. Fowler) in dewatering activated sludge was examined. Observations indicated that the percentage of water in the mixed liquor (containing 98·8–99·8% water) could be reduced to 90–92% and that the material dewatered to this extent could be utilised for making compost. The

possibility of reducing the water content of the sludge to about 50% on the filtering mat itself for subsequent drying of the product in the sun was also studied to some extent.

23. ON THE DISCHARGE OF THE WASTE WATERS FROM BREWERIES AND TEXTILE MILLS INTO MUNICIPAL SEWERS. C. R. Harihara Iyer, R. Rajagopalan and S. C. Pillai, *Science and Culture*, 1951, **17**, 177–78.

Experiments were carried out with mixtures of the trade effluents and domestic sewage by keeping them in shallow basins and by blowing air through the suspensions with and without activated sludge. Observations indicated that ordinarily brewery waste should be diluted over thirty times with domestic sewage and that textile waste be diluted over six times in order that the purification process might set in the sewage-trade effluent mixtures.

24. SALINE MANIPULATION OF BREWING WATERS. C. R. Harihara Iyer, K. Saptha Rishi, R. Rajagopalan and S. C. Pillai, *Science and Culture*, 1951, **17**, 223–25.

The question of water supply of a brewery, as in the cases of most other industries, should be a first consideration when deciding on a new site. On behalf of a firm of brewers in South India, some studies were carried out on the artificial treatment of certain well waters for manufacturing different classes of malt liquors, *e.g.*, pale ale, mild ale, mild beer, and pale beer and bitters, and the results are given. The treated waters were found to yield beers of the desired types.

25. CHROMOSOMES IN YEASTS. M. K. Subramaniam, *Nature*, 1951, **168**, 427.

Yeast chromosomes are neither too small nor too difficult to identify. A photomicrograph is presented showing the two chromosomes orientated on a spindle at the poles of which could be seen the centrioles with the centrospheres.

26. NATURE AND NURTURE IN YEASTS. M. K. Subramaniam, *Proc. Ind. Acad. Sci.*, 1951, **34**, 220–24.

The nature of sculpturing of the giant colonies of the control two chromosome brewery strain is different in Ragi and Barley malt agar. The effects of the alleles are similar but find expression in different directions. Photographs of comparable equivalents in the two media are presented.

27. WHITHER YEAST GENETICS ? M. K. Subramaniam, *Curr. Sci.*, 1951, **20**, 257–59.

The lack of correlation between the genetics and cytology of yeasts has resulted in the presentation of as many alternative explanations for the same phenomenon as there are workers. The basic cause responsible for such divergence of views is the inadequacy of even the elementary criteria employed by Winge and Lindegren to differentiate haploids from diploids. It is shown that the criteria like spore germination, cell size and shape, mating type alleles and sporulation have too many recorded exceptions making them unreliable for the differentiation of a haploid from a diploid. The basic cause for all this confusion is a lack of appreciation of the importance of cytology. Yeast genetics is thus at the cross roads. Ordered progress in the future depends on a fruitful association with cytology.

28. AUTOTETRAPLOIDY AND THE SO-CALLED INBREEDING DEGENERATION IN YEASTS. S. Duraiswami, K. K. Mitra and M. K. Subramaniam, *Curr. Sci.*, 1951, **20** (9), 235–36.

Further evidence in support of the alternative interpretation based on diploidy and tetraploidy for the so-called inbreeding degeneration claimed by Winge and Laustsen is offered on the basis of the yield of dry matter. If the original interpretation that the strating material of Winge and Laustsen is a tetraploid and that their homozygous strain is a diploid is correct, then the autotetraploid and the diploid brewery yeasts should yield same amounts of dry matter. Such in fact is the case when the two strains are propagated under conditions of vigorous aeration. The results indicate that no inbreeding degeneration is implicated in the observations of Winge and Laustsen.

29. CRITICAL EVIDENCE FOR MITOSIS IN YEASTS. Royan Saraswathy and M. K. Subramaniam, *Curr. Sci.*, 1951, **20**, 161–62.

The inequality of the chromosome pair in a mutant top yeast makes it ideally suited for a demonstration that each of the chromosomes divides into a pair of chromatids and that the bud and the mother cell get an unequal pair. Photograph of an anaphase is presented. The strain has retained its original chromosome constitution for the past six years.

30. LYOPHILIZATION AND MUTATION IN YEAST. M. K. Subramaniam and L. S. Prahlada Rao, *Experientia*, 1951, **7** (3), 99.

A culture which was a mixture of mutants was lyophilized. After rejuvenation it showed no similarity to the control at the time of lyophil-

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ization or rejuvenation. The genetic changes on lyophilization are identified as due to gene mutations.

31. TEMPERATURE AS A SELECTIVE FACTOR FOR YEAST MUTANTS. S. N. Krishna Murthy and M. K. Subramaniam, *Curr. Sci.*, 1951, **20**, 17–18.

When the two-chromosome control strain is grown at a temperature of 30–31° C., the giant colonies were of the *Rough II* type. Though mutations do occur, the above temperature acts as a selective environment for the *Rough II* type.

DEPARTMENT OF CHEMICAL TECHNOLOGY
AND CHEMICAL ENGINEERING

1. SOME ASPECTS OF THE EMULSION PROCESS OF WOOL SCOURING. G. N. Bhat, *Indian Textile J.*, 1950, **61**, 34–7, 43.

A discussion of the formation and growth of wool, impurities in raw wool, the principles of operation and characteristics of an ideal scouring liquor, the nature of the emulsifying agent, temperature of scour, and quality of water needed for wool scouring.

2. SOME ASPECTS OF THE EMULSION PROCESS OF WOOL SCOURING. G. N. Bhat, *Indian Textile J.*, 1951, **61**, 733–36, 740.

Four sets of experiments are described with a view to establish the operating conditions for the scouring of 56's Australian combing in a 3-bowl scouring set, the wool being kept moved in each bowl for 5 minutes and using a mixture of Lissapol N and common salt as the detergent. From the data presented, details regarding the temperature of scouring liquor in each of the bowls, the concentration of the detergents in each of the bowls, the hourly additions of the detergents necessary for maintaining the scouring efficiency of the bath have been arrived at. Also an overall costing of the scouring operation for degreasing the wool from an initial grease content of 35% to a residual grease content of 0·8% has been worked out.

3. STUDIES IN WOOL DYEING. G. N. Bhat, A. N. Kothare and V. V. Nadkarny, *Indian Textile J.*, 1950, **60**, 889–93.

The following effects are studied: Variation in concentration of salts used in exhaustion of dye baths, variation in concentration of one component of different binary mixtures of salts used for the exhaustion of dye baths, and the effects of non-electrolytes at various concentrations on the exhaustion of dye baths. The results are tabulated and indicate that the non-electrolytes in general, have an *inhibiting influence* on wool dyeing. Increased concentration of these accessories always led to a decrease in the exhaustion of the dye bath.

4. STUDIES IN WOOL DYEING. G. N. Bhat, A. N. Kothare and V. V. Nadkarny, *Indian Textile J.*, 1950, **61**, 173–6, 163.

The experimental procedure is outlined and results are tabulated of the effects of wetting agents and acids at different concentrations on the exhaustion of dye baths. The amount of dye taken up by the fibre increased

with increasing amounts of acid added to the dye baths. There is a variance in the amounts of a particular dye fixed when the different acids at the same equivalent concentration were used for the exhaustion of the dye baths. At considerably low concentrations of acids, the fixation of a particular dye was found to be very little influenced by the nature of the acid. The per cent fixation of different dyes varied from dye to dye when the same amount of a particular acid was added to the dye baths with the different dyes.