Biochemistry.

Muscular Exercise, Lactic Acid, and the Supply and Utilisation of Oxygen. VII—VIII. K. FURUSAWA, A. V. HILL, C. N. H. LONG, and H. LUPTON (*Proc. Roy. Soc.*, 1924, **B**, **97**, 155—176; cf. A., 1924, i, 1128, 1363).—VII. *Muscular exercise and oxygen intake.*—The oxygen intake increases with increase in the severity of the exercise up to a maximum, conditioned by the limitations of the circulatory–respiratory system. The use of gas mixtures containing a high pressure of oxygen enables a much

higher oxygen intake to be attained. This increase cannot be due simply to more complete saturation of the blood in its passage through the lungs, and it is suggested that a " governor " mechanism exists in the heart-muscle or elsewhere, which tends to co-ordinate the output of the heart with the degree of saturation of the blood leaving it. It is calculated that the output of the heart in man may reach 30 or 40 litres per minute and that in severe exercise the heart-muscle must be supplied with twice its own volume of blood per minute.

VIII. *Muscular exercise and oxygen requirement.*—The oxygen requirement per minute in walking and running rises continually as the speed increases, at high speeds becoming as much as ten times the oxygen intake. The oxygen requirement is a valuable quantitative criterion of the effort made.

The respiratory quotient of the total excess metabolism caused by short-lived muscular effort appears to be unity. Apparently after a short element of muscular exertion the recovery process involves the oxidation simply of lactic acid and carbohydrate, whilst in the intact animal when exercise and recovery are prolonged, a lower respiratory quotient is produced and the oxidation of other substances occurs. O. O.

Mechanism of Oxidation of Succinic Acid and *p*-Phenylenediamine. Theory of Cell Respiration. A. von Szent-Györgyi (*Biochem. Z.*, 1924, **150**, 195—210).—The inhibition of the oxidation of succinic acid in muscle-tissue produced by potassium cyanide is removed by methylene-blue. It is inferred that the oxidation of this acid involves a combination of Wieland's activated-hydrogen and Warburg's activated-oxygen mechanisms. Molecular oxygen is not a hydrogen acceptor. The oxidation of *p*-phenylenediamine, which is also inhibited by cyanide, is not reactivated by methylene-blue; in this case, it is inferred that activated hydrogen plays no part, but, since the diamine contains labile hydrogen atoms, activated oxygen alone is sufficient. J. P.

Carbon Dioxide Equilibrium in Alveolar Air and Arterial Blood. A. V. Bock and H. Field, jun. (*J. Biol. Chem.*, 1924, **62**, 269—274).—The closest approximation between the tension of carbon dioxide in the alveolar air and that in the arterial blood is obtained if the sample of alveolar air is taken at the end of a normal expiration; under these conditions, the tension in the blood is, on the average, 0·48 mm. higher than that in the alveolar air. C. R. H.

Ionic Nature of Hæmoglobin. H. Taylor (*Proc. Roy. Soc.*, 1924, **B**, **96**, 383—397).—By a method similar to that employed by Loeb (A., 1921, i, 627), it is shown that the hæmoglobin in sheep's blood acts as an anion over the whole p_H range of physiological importance and thus support is given to the Zuntz theory relating to the reaction between carbon dioxide and blood. The interior of the corpuscle has a p_H about 33% higher than that of

the accompanying plasma, and the chlorine-ion concentration, although variable, lies between the limits 0·034*N* and 0·091*N*. The normality of the indiffusible protein ion in laked corpuscles is variable, but has a mean value of 0·037*N* over a range of carbon dioxide pressure of 0·4—60 mm. A. J. H.

Effect of Valency of Cations and Anions on Negatively and Positively Charged Red Blood Cells. J. Oliver and L. Barnard (*J. Gen. Physiol.*, 1924, **7**, 225—233).—The valency of the cation determines the degree of the effect on the potential difference at the surface of negatively charged red blood cells in isotonic sucrose solution, that of the anion, the effect on positively charged red cells. Anomalous results obtained with some salts were due in part to change in p_H, caused by hydrolysis of the salt. H. J. C.

Distribution of Ions in the Blood. III. P. Rona, H. Petow, and E. Wittkower (*Biochem. Z.*, 1924, **150**, 468—475).—In a study of the influence of hæmoglobin on the diffusibility of the cations of the blood at varying p_H, it is shown that the distribution of sodium and calcium is in conformity with the Donnan equilibrium, whilst potassium gives similar results only in strongly acid solutions. In the presence of serum, the final distribution of calcium depends on the combined influences of hæmoglobin and serum-proteins, more calcium being associated with the latter than with the former. J. P.

Nature, Properties, and Preparation of the Eosinophile Granule Substance of the Blood. II. Chemical and Physical. A. Neumann (*Biochem. Z.*, 1924, **150**, 256—264).—The eosinophile granule substance is not a protein, but may be associated with protein as indicated by its nitrogen content, micro Millon's reaction, and oxydase or peroxydase reaction. The substance is characterised by its readiness to become associated with other foreign substances—iron, fat, glycogen, etc. J. P.

Blood Clotting. X. B. Stuber. **Detection of so-called Thrombin in Oxalate Plasma.** S. Lee (*Biochem. Z.*, 1924, **150**, 542—547).—Active thrombin can be demonstrated in oxalate plasma after removal of the oxalate. Schmidt's thrombin is therefore inferred to be an artifact of no biological significance. J. P.

Influence of Sodium Chloride on Uric Acid of Blood. V. J. Harding, K. D. Allin, and H. B. Van Wyck (*J. Biol. Chem.*, 1924, **62**, 61—73).—The addition of 15 g. of sodium chloride to the day's diet causes a retention in the blood of water and sodium chloride and a decrease in the serum-proteins and uric acid. It is suggested that the decrease in uric acid is due to increased excretion of the latter caused by the hydræmia. C. R. H.

Blood-sugar Reduction Tables for Bang's "New Method" calculated for 50 to 130 mg. of Blood. H. Dreyfuss (*Biochem. Z.*, 1924, **150**, 211—223).—Tables are given for the direct

reading of blood-sugar values from the weight of sample used and the volume of thiosulphate required in Bang's new method ("Mikromethoden," Bergmann, 1922). J. P.

Sugar Content of Blood-corpuscles. M. Richter-Quittner (*Biochem. Z.*, 1924, **150**, 492—493).—If care is taken to ensure complete hæmolysis, the concentration of sugar in blood-corpuscles is found to be the same as that in the plasma (cf. Falta and Richter-Quittner, *ibid.*, 1919, **100**, 148; Hoegler and Ueberrack, *ibid.*, 1924, **148**, 150). J. P.

Endocrine Glands and Blood Calcium. S. Leites (*Biochem. Z.*, 1924, **150**, 183—194).—The blood calcium of the rabbit falls after removal of the thymus or parathyroid glands, slowly in the former case, rapidly in the latter, whilst a temporary rise followed by a fall in blood calcium is produced by thyroidectomy or by removal of testes or ovary. Administration of glandular preparations to the operated animal corrects these abnormalities. J. P.

Determination of Lipoid Phosphorus in Blood and Plasma. J. C. Whitehorn (*J. Biol. Chem.*, 1924, **62**, 133—138).—The method of Bell and Doisy (A., 1920, ii, 769) has been modified by using larger quantities of sulphuric acid during the incineration in order to avoid errors due to local overheating. The large amount of acid used necessitates certain other modifications in the procedure which are described. C. R. H.

Clinical Method for Determining the Bicarbonate Content of Blood Plasma. J. Holló and S. Weiss (*Biochem. Z.*, 1924, **150**, 501—508).—Two methods, one clinical and the other quantitative, for determining the volume percentage of carbon dioxide in the blood are described, both based on the method of Van Slyke, Stillman, and Cullen (A., 1917, ii, 422). J. P.

Influence of the Method of Obtaining Serum on its Protein Concentration. A. Gromelski (*Biochem. Z.*, 1924, **149**, 261—268).—Leendertz's observations (*Arch. klin. Med.*, 1922, **140**) concerning the lower protein content of serum from whole blood, as compared with that obtained from plasma, are confirmed. J. P.

Distribution of Ions in Blood-serum. II. P. Rona, F. Haurowitz, and H. Petow (*Biochem. Z.*, 1924, **149**, 393—398).—Using a rapid method of compensated dialysis (Rona and Petow, A., 1923, i, 728), it is shown that at p_H 7·8 the chlorine, sodium, and potassium of serum, in contrast to the calcium, are wholly diffusible. These ions show a minimum change of concentration during dialysis when the outer liquid contains a rather lower concentration of the ion concerned than does the serum. This is ascribed to the appreciable volume occupied by the hydrated protein particles. J. P.

Serum Proteins. G. LEENDERTZ (*Biochem. Z.*, 1924, **150**, 494—495).—A reply to von Frey (A., 1924, i, 1123). J. P.

Calcium Content of Serum Protein Fractions. J. CSAPÓ and J. FAUBL (*Biochem. Z.*, 1924, **150**, 509—514).—The calcium contents of fibrin, citrate fibrinogen, serum-globulin, and serum-albumin increase in the order cited, *i.e.*, the finer the dispersion of the protein the greater its calcium content. J. P.

Occurrence of Porphyrin in Blood-serum. A. PAPENDIECK (*Z. physiol. Chem.*, 1924, **140**, 111—112).—Polemical (cf. Fischer, A., 1924, i, 1131). E. S.

Electro-dialysis. H. FREUNDLICH and L. F. LOEB (*Biochem. Z.*, 1924, **150**, 522—534).—The method of electro-dialysis (Pauli, *Kolloid-Z.*, 1922, **31**, 252), whilst convenient in general, is not suited for the dialysis of serum if two parchment membranes are used. In practice, a chromate-gelatin membrane at the anode and a parchment-paper membrane at the cathode as recommended by Ruppel (*Ber. deuts. pharm. Ges.*, 1920, **30**, 314) is at present the most suitable arrangement. J. P.

Simple Clinical Method for Determining Small Amounts of Potassium in Blood-serum and other Fluids. F. LEBERMANN (*Biochem. Z.*, 1924, **150**, 548—559).—The potassium is precipitated as the cobaltinitrite, washed, dried, and dissolved in 27% hydrochloric acid, and the resulting bluish-green solution compared with known standards in a colorimeter. Potassium can be determined with reasonable accuracy in 0·1 c.c. of serum by this method. J. P.

Behaviour of Precipitin and Agglutinin Adsorbed on Charcoal or Kaolin to their Antigen. M. EISLER (*Biochem. Z.*, 1924, **150**, 350—360).—Bone charcoal adsorbs precipitin from typhus and cholera extracts and from the corresponding immune sera if the adsorbent has been previously treated with sodium chloride solution. Charcoal and kaolin previously treated with immune sera adsorb typhus and cholera bacilli, untreated adsorbents only the latter. Horse-serum precipitin adsorbed on charcoal no longer reacts with its antigen. Charcoal or kaolin kept in contact with a sheep-serum agglutinin develops a specific power of adsorbing sheep corpuscles. J. P.

Determination of Bismuth. L. KÜRTHY and H. MÜLLER.—(See ii, 73.)

Determination of Lactic Acid in Animal Organs. H. HIRSCH-KAUFFMANN (*Z. physiol. Chem.*, 1924, **140**, 25—46).—A modification of the von Furth–Charnass method has been elaborated which obviates the necessity of extracting the lactic acid with ether or similar solvents and is similar to that of Anrep and Cannan (*J. Physiol.*, 1923, **58**, 244). The essential feature of the modification is the removal of all carbohydrates from the protein-

free solution. These are precipitated by addition of copper sulphate and milk of lime on the lines of the method of Van Slyke (A., 1918, ii, 86). The filtrate is then employed for the determination of lactic acid. E. S.

Extractives of the Lungs. S. KAPLANSKY (*Z. physiol. Chem.*, 1924, **140**, 69—73).—Creatinine has been isolated from ox lungs in the form of its double salt with zinc chloride; the presence of neither carnosine, methylguanidine, nor carnitine could be detected. The author has failed to confirm the presence of pulmotartaric acid (Poulet, *Archives de Physiol.*, 1888, [iv], **1**, 178) in the dialysate from pig's lungs. E. S.

Colour Test for Guanidine Bases, with Physiological Applications. O. W. TIEGS (*Austral. J. Expt. Biol.*, 1924, **1**, 93—97).—A solution of sodium nitroprusside which has been exposed to air and sunlight for a day gives a red colour with guanidine in neutral solution; the same colour is given in alkaline solution with methyl- and dimethyl-guanidine and with creatine, the colour obtained with creatine fading on keeping. By the use of this test, it has been shown that methylguanidine is not present in skeletal muscle or in putrid meat extract; traces of guanidine bases can be detected in normal human urine. Contrary to the statement of Mellanby (A., 1908, ii, 308), creatine occurs in the chick embryo as early as the fourth day. C. R. H.

Colorimetric Method for Determination of Guanidine and Methylguanidine. H. R. MARSTON (*Austral. J. Expt. Biol.*, 1924, **1**, 99—103).—A reagent consisting of a mixture of sodium nitroprusside and potassium ferrocyanide in sodium hydroxide solution, treated just before use with hydrogen peroxide, gives a red colour with guanidine and methylguanidine, but not with creatine. The reagent has been applied to the colorimetric determination of guanidine bases, using as standard a known solution of guanidine carbonate. C. R. H.

"Lecitiburin," a Lecithin from the Eggs of the Shark. H. P. PONCE (*Anal. Asoc. Quím. Argentina*, 1924, **12**, 103—113; cf. A., 1924, i, 1371).—Further chemical data are given for "lecitiburin." It is shown to be similar to the lecithin obtained from hens' eggs. The possibility of its use in pharmacology is discussed. G. W. R.

Fractional Analysis of Incomplete Protein Hydrolysates. H. WASTENEYS and H. BORSOOK (*J. Biol. Chem.*, 1924, **62**, 1—14).—Protein is precipitated by trichloroacetic acid, metaprotein (in an aliquot portion) by adjusting the reaction to p_H 6·0, proteoses by sodium sulphate at 33°, peptones by tannic acid, and the remaining peptides and amino-acids by alcohol; the amount of each fraction is ascertained by nitrogen determinations before and after precipitation. C. R. H.

Tryptophan and Cystine Content of Various Proteins. D. B. Jones, C. E. F. Gersdorff, and O. Moeller (*J. Biol. Chem.*, 1924, **62**, 183—195).—Tryptophan was determined by the method of May and Rose (A., 1923, i, 160) and cystine by that of Folin and Looney (A., 1922, ii, 539). Figures are given for the percentages of these amino-acids in numerous proteins derived from common foodstuffs. C. R. H.

Organic Phosphorus of the Urine. G. E. Youngburg and G. W. Pucher (*J. Biol. Chem.*, 1924, **62**, 31—44).—The inorganic phosphates of the urine were removed by precipitation with magnesia mixture and the organic phosphorus in the filtrate determined by the method of Bell and Doisy (A., 1920, ii, 769). In normal individuals, variations of 100% were found in the excretion of organic phosphorus in successive 2-hour periods. The total daily excretion varies from 0·089 mg. to 0·187 mg. per kg. bodyweight. C. R. H.

Stalagmometric Investigations on Urine, in particular that of the Large Herbivora. I. Methods. II. Nature of the Capillary-active Substance of Urine. III. Adsorption of the Capillary-active Substance of Urine. K. Kiesel (*Biochem. Z.*, 1924, **149**, 399—414, 415—429, 430—446).—I. In various urines, the dynamic weight per drop when the latter is formed in constant time is a direct measure of the static surface tension. This principle is adopted in stalagmometric investigations on urine.

II. To be effective in lowering the surface tension of urine, colloidal proteins must have at least the molecular dimensions of albumoses.

III. An investigation of the adsorption of the capillary-active substance of urine using as adsorbents charcoal, cellulose, and the froth produced by shaking the urine. J. P.

An Unknown or Little-known Volatile Urinary Substance. E. Pittarelli (*Arch. Farm. sperim. Sci. aff.*, 1924, **38**, 8—12).—Normal urine contains a volatile ketonic compound which gives a greenish-yellow precipitate with Nessler's reagent and a white precipitate with a sulphuric acid solution of mercuric sulphate, and differs from acetone. It is to this compound that the odour of urine is due, either wholly or partly. T. H. P.

Detection of Bilirubin and Urobilin in the Fæces with Trichloroacetic Acid. D. Adlersberg and O. Porges (*Biochem. Z.*, 1924, **150**, 348—349).—A simple and quick test depending on the fact that on treating fæces with trichloroacetic acid the particles containing bilirubin display a green colour, whilst those containing urobilin become red. J. P.

The Porphyrin of Human Fæces. III. A. Papendieck (*Z. physiol. Chem.*, 1924, **140**, 16—24).—Experiments are reported which indicate that the porphyrin excreted in the fæces is formed in the intestine by the action of bacteria on bilirubin. E. S.

Intestinal Chemistry. I. Determination of Intestinal Reductions. II. Intestinal Reductions as a Measure of Putrefaction. Influence of Diet. O. BERGEIM (*J. Biol. Chem.*, 1924, **62**, 45—48, 49—60).—I. A known amount of ferric oxide was added to the diet of experimental animals, the fæces were collected, and the percentage of the total iron present in the ferrous condition was determined, this percentage being taken as an index of intestinal reduction.

II. In the intestine of the rat, reduction takes place almost entirely in the cæcum and large intestine; the amount of reduction is large when the protein of the diet contains much cystine, indicating that the production of hydrogen sulphide is concerned in the process; the carbohydrates and fat of the diet have little effect except in the cases of dextrin and lactose, which diminish the amount of reduction; intestinal antiseptics are without effect, whilst reduction is much increased in intestinal stasis. C. R. H.

Reducing Power of Normal and Cancer Tissue. C. VOEGTLIN, J. M. JOHNSON, and H. A. DYER (*J. Pharm. Exp. Ther.*, 1924, **24**, 305—334).—The rates of reduction of equimolecular proportions of certain dyes under standard anaërobic conditions by different normal and cancer tissues were compared. The most sensitive indicator for the process was found to be *m*-bromophenolindophenol. Blood plasma, serum, and the necrotic part of carcinoma tissue were found to possess no reducing power; all other tissues tested were able to reduce the dyes, the greatest activity being observed with liver, kidney, and testis; the reducing power of actively growing carcinoma tissue is similar to that of normal tissue. The toxic effects following injection of dyes such as methylene-blue can be, in part at least, abolished by simultaneous injection of glutathione, but not by cysteine or thioglycollic acid, from which it is inferred that the function of glutathione may be the regulation of the equilibrium between oxidising and reducing substances in the living cell. The rates of reduction of the dyes employed increase with an increase in their electrode potential. C. R. H.

Determination of Hydrogen-ion Concentration in Tissues and in Cells. M. SCHMIDTMANN (*Biochem. Z.*, 1924, **150**, 253—255).—A method is described for the direct introduction of indicators into living cells and tissues whereby the local hydrogen-ion concentration may be determined. J. P.

Transformation of Glucal into Deoxyglucose in the Rabbit. M. KONDO (*Biochem. Z.*, 1924, **150**, 337—340).—Glucal administered subcutaneously or orally to the rabbit is found in the urine to the extent of 2 to 3% as 2-deoxyglucose, whilst if the latter is administered orally 7% is recovered unchanged in the urine. J. P.

Occurrence of Salicyluric Acid in the Urine after Administration of Salicylic Acid. H. DRZIMAL (*Rec. trav. chim.*, 1924, **43**, 600—605; cf. A., 1918, i, 142).—The urine is made neutral

to litmus, treated with neutral lead acetate solution, and the precipitate filtered off, and washed free from salicylic acid. The precipitate from two successive treatments of the filtrate with basic lead acetate and ammonia, which contains all the organic acids of the urine except uric acid, is suspended in water and decomposed by means of hydrogen sulphide. The filtrate is extracted with a mixture of equal volumes of ethyl acetate and ether, the residue from this extract is redissolved in a mixture of dry ethyl acetate and ether, and the solution is filtered. The residue finally obtained is heated at 100° in order to sublime away the salicylic acid. The non-volatile residue crystallises from water in needles, m. p. 170—172°, and is identified as salicyluric acid. W. E. E.

Comparative Metabolism of Aromatic Acids. VII. Fate of *p*-Chloro-, *p*-Bromo-, and *p*-Amino-acids. L. R. Cerecedo and C. P. Sherwin (*J. Biol. Chem.*, 1924, **62**, 217—230).—After feeding *p*-chloro- and *p*-bromo-phenylacetic acids to dogs and men, the corresponding phenaceturic acids were found in the urine, whilst in the case of the rabbit the acids were excreted unchanged. Administration of *p*-aminophenylacetic acid to man or to the rabbit resulted in the excretion of *p*-acetamidophenylacetic acid; in the case of the dog, there was found instead *p*-aminophenylaceturic acid. C. R. H.

Amino-acid Synthesis in the Animal Organism. Availability of Caproic [*n*-Hexoic] Acid Derivatives for Synthesis of Lysine. D. A. McGinty, H. B. Lewis, and C. S. Marvel (*J. Biol. Chem.*, 1924, **62**, 75—92).—Neither α-hydroxy-*n*-hexoic, ε-hydroxy-*n*-hexoic, ε-amino-*n*-hexoic, nor α-hydroxy-ε-amino-*n*-hexoic acid was able to induce proper growth in rats whose diet was deficient in lysine; none of these acids can therefore be considered as a possible natural precursor of lysine. C. R. H.

Chemical and Physiological Investigations on Bismuth. III. Determination of Bismuth in Urine. L. Kürthy and H. Müller (*Biochem. Z.*, 1924, **149**, 235—238).—The urine is evaporated with nitric acid and potassium nitrate and the bismuth determined, either colorimetrically by conversion into brown colloidal bismuth sulphide using gum arabic as a protective colloid, or by electrolytic deposition on a platinum cathode. J. P.

Chemical and Physiological Investigations on Bismuth. IV. Excretion of Orally Administered Bismuth. H. Müller and L. Kürthy (*Biochem. Z.*, 1924, **149**, 239—244).—Bismuth oxide administered *per os* to a dog is eliminated slowly, thirty times as much appearing in the fæces as in the urine, whilst during continued administration of large amounts of bismuth the fæces may contain up to 1000 times that present in the urine. Considerable quantities of bismuth may be retained for prolonged periods. J. P.

Chemical and Physiological Investigations on Bismuth. V. Excretion of Subcutaneously and Intramuscularly Administered Bismuth. L. KÜRTHY (*Biochem. Z.*, 1924, **150**, 173—176).—The elimination of bismuth ("Oleobi") injected intramuscularly into the dog is slow, some 20% of the total quantity administered being excreted in 4 weeks, 58·8% in the urine and 41·2% in the fæces. Of another bismuth preparation ("Bismokutan") administered by external rubbing, 30% was excreted in 20 days, 94·3% in the fæces and 5·7% in the urine. J. P.

Action of Undissociated Drugs. E. KEESER (*Biochem. Z.*, 1924, **150**, 515—521).—Phenol is more toxic to *Staphylococcus* in acid solution in which it is undissociated than in the dissociated condition in alkaline solution. Similar findings by other observers are discussed in relation to the increase of surface action associated with larger molecules or lessened solubility. J. P.

Power of Adsorption and Detoxication of Various Charcoals. KAP-SOO-LEE (*Biochem. Z.*, 1924, **150**, 341—347).—Various charcoals tested *in vivo* show the same detoxicating properties with regard to sodium arsenite, sodium salicylate, and strychnine, but their activities in this respect are not indicated by the extent to which they adsorb iodine *in vitro*. The latter is therefore not a trustworthy pharmacological test of the detoxicating power of charcoal. J. P.

Hepatic Function. VI. Pharmacological Behaviour of Phthalein Dyes. Value of Phthalein Compounds in Estimation of Hepatic Function. S. M. ROSENTHAL and E. C. WHITE (*J. Pharm. Expt. Ther.*, 1924, **24**, 265—288).—The disulphonic acid derivatives of phenoltetrahalogenophthaleins are excreted in the bile, after intravenous injection, to the extent of 60—90%, traces only appearing in the urine. Of this group of substances, the sodium disulphonate of phenoltetrabromophthalein is the most rapidly excreted in the bile in the normal individual, and therefore shows the most marked retention in the blood-stream when hepatic function is impaired. Mercurochrome, which has a strong bactericidal action, is excreted in the bile to the extent of 30—55%, and its use is suggested as a biliary antiseptic. C. R. H.

Passage of Boric Acid through the Skin by Osmosis. L. KAHLENBERG (*J. Biol. Chem.*, 1924, **62**, 149—156).—After immersion of the feet in a warm solution of boric acid, the latter could be detected in the urine; this was not so if sodium or lithium borate were substituted for boric acid, nor could passage through the skin of numerous other diffusible substances, under the same conditions, be demonstrated. C. R. H.

Possibility of Identifying Chemical Processes in Living Matter. W. J. CROZIER (*Proc. Nat. Acad. Sci.*, 1924, **10**, 461—464).—On the assumption that the critical increments of reactions influenced by a common catalyst are the same, the values of the

critical thermal increments of vital processes permit of the classification of protoplasmic activities on a dynamic basis and of the identification of reactions in living matter on the basis of the catalysts involved. J. S. C.

Biological Oxidations as Function of Temperature. W. J. CROZIER (*J. Gen. Physiol.*, 1924, **7**, 189—216).—The critical thermal increments for the respiratory processes of various plants and animals have been calculated, and may be of two, possibly three, types: μ=11,500, 16,100, or 16,700. For the reduction of methylene-blue by bacteria by removal of hydrogen from succinic acid, μ=16,700, a result similar to that obtained for biological respirations in which a dehydrogenation mechanism appears to be of general occurrence, and in which iron has probably a catalytic function. The critical thermal increment for the oxidation of Fe″ is 16,140, which may be compared to respiration in sea-urchins' eggs, for which iron is a catalyst. H. J. C.

Autolysis. XIII. Kinetics of Autolytic Mechanism. A. B. HERTZMANN and H. C. BRADLEY (*J. Biol. Chem.*, 1924, **62**, 231—243).—In the autolysis of liver at optimum p_H the primary cleavage of the proteins, measured by the proportion of the total nitrogen which cannot be precipitated by trichloroacetic acid, is complete in 15 days, but only about one-third of the total nitrogen is found in the form of free amino acid nitrogen. This indicates that the secondary hydrolysis of proteoses and peptones to amino-acids reaches an equilibrium; the equilibrium constant for this secondary reaction has a value of about 0·56. The inhibition of autolysis brought about by the presence of a foreign protein previously noted (A., 1924, i, 1149) is due to a combination of the latter with the primary protease, which is thus removed from the sphere of action. C. R. H.

Taka-rennin. J. HATANO (*Biochem. Z.*, 1924, **149**, 228—231).—Taka-diastases contain, in variable amounts, a rennin-like enzyme which acts on fresh milk and on calcium–casein solutions. J. P.

Enzymic Synthesis of Protein. I. Synthesising Action of Pepsin. H. WASTENEYS and H. BORSOOK (*J. Biol. Chem.*, 1924, **62**, 15—29).—By the action of pepsin at p_H 4·0 on a concentrated solution of the products of peptic hydrolysis of egg-albumin, a precipitate corresponding with the plastein of Sawjalov (A., 1908, i, 234) was obtained. This substance may contain as much as 39% of the nitrogen of the original solution, and is of the order of molecular complexity of egg-albumin. Plastein is rapidly hydrolysed by pepsin at p_H 1·7, whereas the proteoses left in solution after plastein has been synthesised are not attacked by the enzyme; it is therefore assumed that the synthesis of plastein involves the re-synthesis by pepsin of some particular linking, which, under other conditions of dilution and acidity, is hydrolysed. Plastein is almost insoluble in water, fairly easily soluble in dilute acid, and still more easily soluble in dilute alkali; in alkaline solution, it is heat-coagulable and is partly precipitated by half-saturation with

sodium chloride. If a solution of albumin be added to a concentrated solution of the products of its peptic hydrolysis, the albumin is quantitatively precipitated and the precipitate resembles plastein in its physical properties; it is thought that this phenomenon may account for the differences between plastein and natural egg-albumin. No synthetic action of pepsin on the products of peptic hydrolysis of gelatin could be demonstrated. C. R. H.

Nephelometric Investigations on Enzymic Protein Hydrolysis. II. Influence of Ions on Peptic Digestion. P. Rona and H. Kleinmann (*Biochem. Z.*, 1924, **150**, 444—467).—Using the methods already described (A., 1923, ii, 890; i, 1145; 1924, i, 790), the optimum p_H for peptic digestion is found to be 2·1 to 2·2. The influence of sodium, potassium, calcium, aluminium, chloride, nitrate, and sulphate ions on peptic digestion is qualitatively similar, all having an inhibiting action at the optimum and on the acid side of it, whilst on the alkaline side, when present in low concentration, they increase the activity of the enzyme, but display an inhibitory effect in higher concentrations. J. P.

Tryptic Digestion with Dilute Enzyme Solutions. R. Ehrenberg (*Biochem. Z.*, 1924, **149**, 269—293).—From a lengthy series of observations on the proteolytic action of trypsin in very dilute solutions on casein, egg-albumin, and gelatin, support is gained for the view that the enzyme undergoes a change in the course of its action, whereby its activity is lowered, by an association formed with inhibitory substances liberated or built up during the hydrolysis (cf. also A., 1922, i, 597). J. P.

Milk and Gastric Lipase. F. Demuth (*Biochem. Z.*, 1924, **150**, 392—406).—The stalagmometric determination of lipase, using tributyrin, is influenced by the presence of fat and protein. The inhibition of gastric lipase by casein is removed on coagulation of the casein by rennin. J. P.

Fat-hydrolysing Enzyme of Taka-diastase. I. Ogawa (*Biochem. Z.*, 1924, **149**, 216—227).—Taka-diastase contains a lipase which shows an optimum activity at p_H 8·5 to 9·3, and, unlike other lipases with the exception of bacterial lipase (Michaelis and Nakahara, *Z. Immun. Forsch.*, 1923, **36**, 449), is inhibited by borates. It is stable in the presence of quinine and potassium cyanide, and is but slightly affected by atoxyl and sodium fluoride. J. P.

Hydrolysis of Leucine Ester by Pancreatic Enzymes. P. Rona and P. E. Speidel (*Biochem. Z.*, 1924, **149**, 385—392).—The ethyl and propyl esters of *iso*hexoic acid are hydrolysed by the lipase of the pancreas, and not by the trypsin. Similar conclusions are reached regarding the hydrolysis of the ethyl and propyl esters of *dl*-leucine by pancreatic enzymes (cf. Warburg, A., 1905, i, 176). J. P.

Influence of Dextrose and Lævulose on Rate of Hydrolysis of Sucrose by Invertase from Honey. J. M. NELSON and C. T. SOTTERY (*J. Biol. Chem.*, 1924, **62**, 139—147; cf. A., 1924, i, 1143). —The addition of dextrose up to 2% accelerates the inversion of sucrose by honey invertase; above 2%, the reverse effect is obtained; similar, but less marked, effects are obtained with lævulose. α-Glucose has less influence on the reaction than β-glucose or ordinary dextrose, whilst the effects of ordinary lævulose and of β-fructose are identical. C. R. H.

Approximative Colorimetric Method for the Determination of Urea, with an Application to the Detection and Determination of Arginase. A. HUNTER and J. A. DAUPHINEE (*Proc. Roy. Soc.*, 1924, **B**, **97**, 209—226).—Kay's method (A., 1923, i, 722) with certain refinements has been used for the determination of urea in urine and in the blood of elasmobranch fishes. The method has also been extended to the determination of urea formed in the hydrolysis of arginine by arginase. In this way, the activities of arginase in different extracts are compared. O. O.

Distribution of Arginase in Fishes and other Animals. A. HUNTER and J. A. DAUPHINEE (*Proc. Roy. Soc.*, 1924, **B**, **97**, 227—242).—Using the colorimetric method (cf. preceding abstract), the distribution of arginase has been determined in various organs of fishes and other animals. It is present in the livers of all fishes examined, and in this organ appears to be constant and characteristic for any one genus. The livers of mammals are much more active than those of fishes. In fishes, next to the liver, the heart is the most active organ, but in mammals, birds, and Chelonia it is inactive. Apart from the liver, kidney, and heart, the distribution of the enzyme in other organs of fishes is variable, whilst in mammals it is confined to the liver and kidneys. It is rarely, if ever, found in the tissues of invertebrates. O. O.

Auxoureases. T. HOSOKAWA (*Biochem. Z.*, 1924, **149**, 363—373).—By precipitation of urease preparations with cholesterol, a fractional separation of urease from its naturally occurring auxo-substances is achieved. The inactive enzyme so obtained is reactivated by the addition of auxo-substances. Fibrin may act as one of the latter, since practically inactive urease shows a marked increase in activity when adsorbed on this protein. Calcium and strontium chlorides also increase the activity of urease, but not so markedly as does potassium cyanide, whilst barium chloride is practically devoid of such action. Sodium citrate, oxalate, and fluoride similarly act as auxo-ureases, whilst potassium and sodium chlorides have little action. The action of magnesium chloride is antagonistic to that of strontium chloride, and under proper conditions sodium chloride shows a similar antagonism to strontium. The activity of the enzyme is enhanced if the activating salts are kept in contact with urea for 10 minutes before the urease is added. J. P.

Fermentation Co-enzyme (Co-zymase) of Yeast. VI. Further Isolation Experiments. H. VON EULER and K. MYRBÄCK (*Z. physiol. Chem.*, 1924, **139**, 281—306).—After purification by fractional precipitation with lead acetate (A., 1924, i, 1141), the co-enzyme can be further concentrated by precipitating with silicotungstic acid, grinding the precipitate with water, removing the silicotungstic acid by cautiously adding barium hydroxide until no further precipitate is produced, and filtering. Precipitation may also be effected with phosphotungstic acid or tannin, but recovery is more difficult in the case of the former reagent whilst it cannot be effected with the latter, although the tannin precipitate is itself highly active. The most active solution of the co-enzyme gave the ninhydrin, the diazo, and Molisch's reactions. The biuret, xanthoproteic, and Millon's reactions diminished in intensity as the purification progressed and finally failed with the most active preparation. Neither hydrogenation in the presence of platinum-black nor treatment with iodine appears to destroy the co-enzyme. The authors' work on the co-enzyme is summarised. E. S.

Action of Living Yeast on Lactic Acid. K. MYRBÄCK and B. EVERITT (*Z. physiol. Chem.*, 1924, **139**, 272—280).—The experiments of von Fürth and Lieben (A., 1922, i, 502, 1219) on the destruction of lactic acid by yeast have been confirmed. E. S.

Behaviour of Oxygenated Yeast to β-Hydroxybutyric Acid. J. MARIAN (*Biochem. Z.*, 1924, **150**, 281—289).—Under conditions which lead to the oxidation, assimilation, or decarboxylation of lactic, pyruvic, and acetoacetic acids by yeast, β-hydroxybutyric acid is unaffected. J. P.

Assimilation of Glycerol by Oxygenated Yeast. J. MARIAN (*Biochem. Z.*, 1924, **150**, 290—303).—In the presence of oxygen, yeast assimilates glycerol with no corresponding formation of carbon dioxide. The assimilation is independent of the glycerol concentration and proceeds according to the equation: $2nC_3H_8O_3 + nO_2 = (C_6H_{10}O_5)_n + 3nH_2O$, an easily hydrolysable polysaccharide being formed. It is supposed that a triose may play an intermediate part in the synthesis. J. P.

Behaviour of the Reserve Carbohydrate of Yeast in Assimilation and Dissimilation. J. WARKANY (*Biochem. Z.*, 1924, **150**, 271—280).—Glycogen and gums form a source of reserve carbohydrate in yeast, the former increasing by 84 to 288% and the latter by 28 to 56% in a nutrient medium, and both diminishing during self-fermentation. A third reserve carbohydrate is also formed in yeast. This yields on hydrolysis with 2·7% hydrochloric acid a compound which reduces Fehling's solution in the cold. It is formed in much smaller amounts than the other two sugars and disappears completely during self-fermentation. J. P.

Synthesis of Coproporphyrin by Yeast and the Factors which Influence it. I. H. FISCHER and H. FINK (*Z. physiol. Chem.*, 1924, **140**, 57—68).—Kammerer's porphyrin has been

detected in summer yeast, but its presence is probably due to impurities of animal origin. With winter yeast and yeast cultures grown on synthetic media, only coproporphyrin could be detected. The suggested dualism of the pigment in yeast (A., 1924, i, 894) cannot therefore be maintained. E. S.

Regularity of Lactic Fermentation in the Presence of Mercuric Chloride. A. LUMIÈRE (*Ann. Inst. Pasteur*, 1924, **38**, 1045—1051).—The irregularities in lactic fermentation experiments observed by Richet (cf. *B.*, 1924, 112) are shown to be due to the precipitation of proteins by mercuric chloride, forming clots in which the bacteria are segregated. [Cf. *B.*, 1924, 193, 227, 532.] G. S. W.

Formation of Plant Growth-promoting Substances by Micro-organisms. (MISS) F. A. MOCKERIDGE (*Ann. Bot.*, 1924, **38**, 723—734).—Nucleic acid derivatives had a favourable effect on the growth of *Lemna minor*. Similar results were obtained with a sterilised culture of *Azotobacter* and with autolysed and autoclaved yeast; of the last two, the latter was the more effective. All these substances contain residues which are found in nucleic acid. *Azotobacter* and *B. radicicola*, both nitrogen-fixing organisms, show a positive Folin–Macullum vitamin reaction. O. O.

Staling of Fungal Cultures. II. Alkaline Metabolic Products and their Effect on the Growth of Fungal Spores. (MISS) C. A. PRATT (*Ann. Bot.*, 1924, **38**, 599—615).—"Staling" is suggested as being due to the formation of hydrogen carbonate, particularly of potassium and to a less degree of ammonium. At p_H 8·2 produced by potassium bicarbonate, the growth of *Botrytis cinerea* is inhibited. O. O.

Ammonification of Amino-nitrogen by the *Microsiphoneæ* of the Soil. G. GUITTONNEAU (*Compt. rend.*, 1924, **179**, 512—514; cf. A., 1924, i, 807).—The action of cultures of seven different species of *Microsiphoneæ* in synthetic media containing mineral salts and either glycine, alanine, leucine, or tyrosine shows that these amino-acids are not attacked with equal facility by all the organisms. H. J. E.

Insulin. I. Preparation and Standardisation of Insulin. II. Effect of p_H on Activity of Insulin subjected to High Temperatures. F. M. CHEADLE (*Austral. J. Expt. Biol.*, 1924, **1**, 121—128, 129—130).—I.—A method of preparation (involving no new features) of insulin is described by which the yield obtained is about 250 rabbit units per kg. of fresh pancreas. Mice were used for the standardisation of the insulin; defining a "mouse-unit" as the amount of insulin necessary to cause convulsions in 60% of the animals used, when injected subcutaneously under constant conditions, it was found that 167 such units were equivalent to one 2-kg. rabbit unit.

II.—If solutions of insulin are autoclaved at 125° for 20 minutes at p_H 2, the loss of activity is about 20%; in some cases, however, a precipitate was formed which carried down much of the active

substance, causing a greater loss of activity. At p_H 4, the loss is much greater, even if the solution remains clear. C. R. H.

Effect of Insulin on the Lactic Fermentation. A. A. Noyes and H. W. Estill (*Proc. Nat. Acad. Sci.*, 1924, **10**, 415—418).—The possibility of assaying insulin by simpler methods than the use of tests on animals has been studied. The insulin was precipitated from a technical aqueous solution in two fractions: the first by adding much alcohol, the second from the mother-liquors of the first by adding ether. By tests on rabbits, the second fraction was found to be twice as strong as the first. Solutions of the two fractions were made up of the same strength, calculated on this basis; suitable amounts of these solutions were added to cultures of *Lactobacillus bulgaricus* and *L. acidophilus* in diluted skim-milk containing glucose. After coagulation had occurred (in about 20 hours), the liquor was filtered off and titrated with 0·05*N*-sodium hydroxide solution. The mixture containing insulin coagulated more quickly than the "controls," and from 20 to 25% more lactic acid was produced when insulin was present. Similar results were obtained with both fractions, *i.e.*, the impurity in the first fraction had no effect. This finding was confirmed by a further "control" in which boiled ("inactivated") insulin solution was used. The effect on *L. bulgaricus* was greater than that on *L. acidophilus*. W. A. S.

May Insulin Affect the Assimilatory or Dissimilatory Functions of Oxygenated Yeast? O. Fürth (*Biochem. Z.*, 1924, **150**, 265—270).—Insulin has no influence on the carbon dioxide produced, the sugar consumed, or the glycogen and gums formed by yeast shaken in contact with air. J. P.

Fat-soluble Vitamins. XX. Modified Technique for Determination of Vitamin-*A*. H. Steenbock, M. T. Nelson, and A. Black (*J. Biol. Chem.*, 1924, **62**, 275—286).—The material to be tested was added to a basal diet lacking both vitamin-*A* and the anti-rachitic factor; the deficiency of the latter was made good by irradiation of the animals with ultra-violet light; the amount of vitamin-*A* was determined by the rate of growth induced. It was found that hog millet and ordinary millet, which are deficient in the anti-rachitic factor, contain vitamin-*A*, as does also lucerne which has been cured in the dark. C. R. H.

Colour Reactions of the Fat-soluble Vitamins. Bezssonoff (*Compt. rend.*, 1924, **179**, 572—574; cf. A., 1921, ii, 608).—By using pure crystalline phosphomolybdotungstic acid as reagent, the anti-rachitic principle may be detected by the orange and vitamin-*A* by the blue colorations produced. The former colour is due to the presence of a derivative of the anti-rachitic substance which is formed from it by prolonged heating and also by atmospheric oxidation. H. J. E.

Fat-soluble Vitamins. XIX. Induction of Calcifying Properties in a Rickets-producing Ration by Radiant Energy. H. Steenbock and M. T. Nelson (*J. Biol. Chem.*, 1924, **62**, 209—

216).—The previous work by Steenbock and Black (A., 1924, i, 1272) is confirmed by histological observations. C. R. H.

Calcium Assimilation. V. Effect of Light on Calcium and Phosphorus Equilibrium in Mature Lactating Animals. E. B. Hart, H. Steenbock, and C. A. Elvehjem (*J. Biol. Chem.*, 1924, **62**, 117—131).—Goats fed on a diet deficient in the anti-rachitic factor were found to fall into a negative calcium balance, this condition coming on more rapidly if the animal was lactating; on exposure of the animals to ultra-violet light for a daily period of 20 minutes, without change of diet, the calcium balance became positive and the inorganic phosphorus of the blood increased. C. R. H.

Jendrassik Reaction for Vitamin-*B*. V. E. Levine (*J. Biol. Chem.*, 1924, **62**, 157—161).—The reaction described by Jendrassik (A., 1923, ii, 892) is given by almost all compounds containing a phenolic group; such compounds, in common with vitamin-*B*, fail to give the reaction after boiling with sodium hydroxide; the test is therefore not specific for vitamin-*B*. C. R. H.

Vitamin Studies. Water-soluble Growth-promoting Factor. I. Determination of the Factor Promoting Growth in Bacteria. H. Davidsohn (*Biochem. Z.*, 1924, **150**, 304—336).—It is proposed to classify in one group the growth-promoting vitamins which act on yeast, bacteria, etc. In particular methods of determining the vitamins promoting bacterial growth have been investigated. Optical methods of measuring the opacity produced by the growth of the bacteria are preferred, the amount required to cause the opacity of a culture to increase twofold in 4 hours at 37° when compared with a standard suspension of *Bacillus coli* being determined. The relationship of this group of vitamins to others is discussed. J. P.

Relation of Treatment of Natural Foodstuffs to their Effect on Growth and Reproduction. H. G. Miller and W. W. Yates (*J. Biol. Chem.*, 1924, **62**, 259—268).—Extraction with cold water removes from maize the dietary factor necessary for reproduction in rats; this factor could be supplied by adding fresh maize, kale, wheat embryo, or an alcoholic extract of the latter (cf. Mattill, Carman, and Clayton, A., 1924, i, 1389). C. R. H.

Chemistry of Alkatan. J. S. Hepburn and R. H. Stroh (*Amer. J. Pharm.*, 1924, **96**, 804—809).—The dried leaves of alkatan (*Piper acuminatissimum*) contain no alkaloid. An oleoresin and a saponin were found. E. M. C.

Sterol of Scopolia Root. A. Windaus and J. Brunken (*Z. physiol. Chem.*, 1924, **140**, 109—110).—This sterol has been identified as sitosterol. E. S.