# Physiological Chemistry.

**Ionic Equilibrium in the Animal Organism. II. The Influence of Carbon Dioxide on the Division of Electrolytes between the Blood-corpuscles and Plasma.** KARL SPIRO and LAWRENCE J. HENDERSON (*Biochem. Zeitsch.*, 1908, **15**, 114—122).—The explanation of Zuntz's observation that the passage of carbon dioxide into blood increases the alkalinity of the plasma, as determined by titration, has been ascribed to the selective action of the living membrane. The phenomenon can, however, be explained as a purely physico-chemical process. If a dialysed globulin solution is mixed with sodium hydrogen carbonate, a solution of the hydrogen carbonate placed in a dialyser inside the former solution, and carbon dioxide be led into both liquids, the alkalinity of the inner liquid increases. This can be explained by assuming that the following reaction takes place: Na-globulin + $H_2CO_3$ = $NaHCO_3$ + H-globulin. This increase of sodium salt increases the osmotic pressure of the inner liquid, to compensate for which, water passes out from inside and the carbonate passes to the inside, and thus increases the alkalinity. In the case of blood, a similar reaction takes place between the proteins and carbon dioxide when the latter is passed through. In the corpuscles, the protein content is higher than in the plasma, and a reaction then takes place between potassium phosphate and carbonic acid, leading to the formation of potassium monophosphate and potassium hydrogen carbonate. As a result, the osmotic pressure of the corpuscles becomes greater than that of the serum. Water will therefore have a tendency to pass from the corpuscles to the plasma, and as the cell walls are not permeable to the cations, the system will be "neutralised" by a wandering of anions, chlorine ions passing into the cells and $OH^+$ and $^-HCO_3$ ions into the plasma. A plasma will therefore be obtained with smaller chlorine content, and greater alkalinity. S. B. S.

**Coagulation of Blood.** JOHN MELLANBY (*J. Physiol.*, 1908, **38**, 28—112).—Many of the experiments recorded do not support Morawitz's views on the causes of blood-coagulation. Fibrinogen is always associated with prothrombin, and therefore solutions of this substance may be coagulated by kinase and calcium chloride, or by fibrin-ferment. The residual fluid after coagulation contains fibrin-ferment generated from the prothrombin by kinase and calcium chloride; if, however, fibrin-ferment is used as the coagulant, the residual fluid contains prothrombin, but no ferment. The action of calcium is considered to be specific. Salts which inhibit coagulation may precipitate calcium salts, and those which do not precipitate calcium salts may restrain coagulation by holding fibrin in solution, or by depressing the action of calcium and kinase on prothrombin. Plasma and serum contain a large amount of anti-fibrin ferment, but not an anti-kinase; the former is very susceptible to the action of alcohol. Serum usually contains no prothrombin. The activity of Schmidt's fibrin-ferment depends mainly on the presence of kinase and calcium salts in it. Gamgee's ferment solution is one of fibrin-ferment dissolved out by sodium chloride solution from the fibrin which had adsorbed it. Serum-globulin (in the author's sense) is probably derived from the decomposition of fibrinogen under the influence of fibrin-ferment. Serous fluids contain the same substances, but in smaller quantity than the bird's plasma which was employed in most of the present experiments; they therefore coagulate on the addition either of kinase (prepared from testis) or of fibrin-ferment. W. D. H.

**Hæmagglutination and Hæmolysis.** M. VON EISLER (*Centr. Bakt. Par.*, 1909, **48**, ii, 679—681).—Polemical against von Liebermann; the views put forward by this author (Abstr., 1908, ii, 865) are different from those originally propounded by him, but very similar to those of Landsteiner. G. B.

**Seromucoid.** HUBERT W. BYWATERS (*Biochem. Zeitsch.*, 1909, **15**, 322—343).—Blood was coagulated in slightly acid solution by means of steam. The filtrate from the coagulum was concentrated, and the solution thereby obtained submitted to dialysis. It was then filtered, and, after further concentration, acidified with acetic acid and thrown into three times the volume of alcohol. The crude seromucoid obtained in this way is pigmented, and the author describes a method of purification by means of sulphur dioxide. In properties, seromucoid is similar to ovomucoid, but differs from the latter by the intensity with which it gives Hopkins and Coles' glyoxylic acid reaction and by the fact that no scission of sulphur takes place when treated with concentrated alkali hydroxide. It gives most of the other characteristic protein reactions. It contains 47·6% C, 6·8% H, 11·6% N, and 1·75% S. There is 25% carbohydrate in the molecule; this was isolated as a hydrolysis product in the form of glycosamine. The quantity of seromucoid in the blood is small; a method is described for its quantitative estimation; it increases after a meal rich in carbohydrates—in the case of dogs from about 0·3 to 0·9 gram per litre of blood. In spite of its small quantity, the carbohydrate it contains accounts for about 10% of the total circulating in the blood, and the results obtained justify Pavy's hypothesis that, after carbohydrate ingestion, a part enters the circulation in combination with proteins. Seromucoid was also isolated from the mucous membrane of the intestine. S. B. S.

**The So-called "Albumose" in Normal Blood.** HUBERT W. BYWATERS (*Biochem. Zeitsch.*, 1909, **15**, 344—349).—The author criticises the methods by which previous observers have arrived at the conclusion that albumoses exist in the blood. He concludes that albumoses are absent, and that what has been regarded as albumose is in reality seromucoid. S. B. S.

**Prolonged Existence of Adrenaline in Blood.** D. E. JACKSON (*Amer. J. Physiol.*, 1909, **23**, 226—245).—If the blood of a dog poisoned with adrenaline is injected into another or the same animal, it produces a rise of blood-pressure, provided the rise of pressure in the first dog still persists. But if the blood-pressure in the first dog has regained its normal level, which is usually in about a minute after the injection, the blood of that dog will no longer produce a rise of pressure when injected into a second animal. W. D. H.

**The Effect on Blood-Pressure of *l*-, *d*-, and *dl*-Suprarenine (Adrenaline).** EMIL ABDERHALDEN and FRANZ MÜLLER. **The Resolution of *dl*-Suprarenine into its Components.** FRANZ FLÄCHER (*Zeitsch. physiol. Chem.*, 1908, **58**, 185—188, 189—194).—In the first paper, Cushny's statement that *l*-adrenaline has a powerful effect on blood-pressure, that *d*-adrenaline has a feeble effect, and that *dl* adrenaline has an intermediate effect, is confirmed. In the second paper, the methods are described for the resolution of synthetic *dl*-adrenaline into its optically active components. The methods used consisted in the growth of the mould *Penicillium glaucum*, and in the fractional precipitation of salts. Under the latter head, the tartrates gave the best results. The naturally-occurring *l*-adrenaline gives a crystallisable tartrate. The rotatory powers of the two substances are $[\alpha]_D^{19\cdot6}$ $-51\cdot40°$ and $[\alpha]_D^{19\cdot8}$ $+51\cdot88°$ respectively. W. D. H.

**Influence of Quinine on Phagocytosis.** TH. GRÜNSPAN (*Centr. Bakt. Par.*, 1908, i, **48**, 444—450).—Weak (less than 0·002%) solutions of quinine have no appreciable influence on phagocytosis *in vivo*; a 0·002% solution increases it, and a 0·1% solution diminishes it. Egg-albumin leads to no increase of phagocytic activity. The intracellular *Staphylococci* appear to be living as judged by their staining reactions. Further work is in progress, as some of the results are regarded as questionable. W. D. H.

**Phagocytosis.** HEINRICH BECHHOLD (*Chem. Zentr.*, 1908, ii, 1269—1270; from *Münch. med. Woch.*, 1908, **55**, 1777—1798).—The inhibiting action of sodium hydroxide on the phenomenon is lessened by the presence of serum, and still more so by the unaltered blood. Relatively large quantities of lactic acid do not act in this way, even although they produce microscopic alterations of the phagocytes; oxygen and carbon dioxide have no effect, and carbon monoxide has no inhibitory effect. Various colloidal materials were investigated, but they were unable to influence phagocytosis as serum does; the colloidal properties of serum *per se* therefore play no part in the phenomenon. The action of pepsin and pancreatin is stimulated by lactic acid. W. D. H.

**Salivary Secretion. IV. Influence of Non-electrolytes.** A. JAPPELLI (*Zeitsch. Biol.*, 1908, **51**, 435—459).—Strongly hypertonic solutions of non-electrolytes injected into the blood-stream raise the osmotic pressure of the blood, and also, after a short time, increase the concentration of the electrolytes in that fluid. The organism appears to have the power to maintain the osmotic pressure, and also the proportion between electrolytes and non-electrolytes, at a constant level. The physico-chemical properties of the submaxillary saliva obtained by stimulation of the chorda tympani nerve appear to be independent of the osmotic concentration of the blood, but they are influenced by such electrolytes and non-electrolytes as are permeable through the secreting cells. Dextrose is not permeable, sucrose and lactose only slightly so; these substances hardly alter the saliva at all, although, owing to the greater amount of salts which pass into the blood from the tissues when they are present, they do so indirectly, leading to the production of a saliva rich in salt. An excess of sodium ions in the blood, however, inhibits salivary activity. W. D. H.

**Action of Peroxides on the Digestive Organs.** TOGAMI (*Chem. Zentr.*, 1908, ii, 1275; from *Berl. klin. Woch.*, 1908, **45**, 1528—1532).—The three substances investigated, hydrogen peroxide, magnesium peroxide, and sodium percarbonate, favour gastric secretion.

Hydrogen peroxide (0·1 to 1%) has no effect on the action of ptyalin, pepsin, trypsin, or amylopsin. The other two substances have also no effect, but magnesium chloride favours the action of diastatic ferments, in virtue of the chlorine ion.

Concentrated solutions of hydrogen peroxide produce profuse secretion of mucus, but dilute solutions have no effect on the gastric mucous membrane. W. D. H.

**Action of Hydrochloric Acid on the Secretion of Ferments of the Stomach and Pancreas.** R. EHRMANN and R. LEDERER (*Chem. Zentr.*, 1908, ii, 1274; from *Berl. klin. Woch.*, 1908, **45**, 1450—1452).—In opposition to the statements of earlier investigators, the administration of hydrochloric acid either with or after a test meal produces no increase in the secretion of pepsin. The amount of trypsin secreted by the pancreas is also lessened, and Pawloff's view that hydrochloric acid acts as a specific stimulus for pancreatic secretion is regarded as incorrect. W. D. H.

**The Influence of Acids on the Calcium Metabolism of Herbivora.** E. GRANSTRÖM (*Zeitsch. physiol. Chem.*, 1908, **58**, 195—213).—Rabbits were fed on various diets (cream, wheat), and hydrochloric acid or phosphoric acid added to the food. The effect on calcium excretion in urine and fæces was investigated; both during inanition and after feeding, the calcium in the urine is increased by acid; the amount in the fæces falls except in two cases of phosphoric acid feeding, but the influence of this acid on the fæces is far from clear. Suggestions are made regarding the therapeutic uses of acids in man. W. D. H.

**Carbohydrate Metabolism.** JOHAN E. JOHANSSON (*Chem. Zentr.*, 1908, ii, 1373; from *Scand. Arch. Physiol.*, 1908, **21**, 1—34).—In men, carbohydrate food produces an increase in the output of carbon dioxide, but the amount varies considerably; in doses beyond 150 grams no further increase occurs. Lævulose causes twice as great an increase in carbon dioxide excretion as the same amount of dextrose. Conditions affecting the output which were investigated are (1) previous state of hunger or not; this largely depends on the amount of glycogen storage; and (2) adiabetic condition: here the results are very inconstant. W. D. H.

**Rôle of Inorganic Phosphorus in Nutrition.** EDWIN B. HART, ELMER V. MCCOLLUM, and J. G. FULLER (*Amer. J. Physiol.*, 1909, **23** 246—277).—A number of young pigs were fed on normal diets, on diets containing a minimal amount of phosphates, and on diets containing an excess of these salts. In some experiments, nuclein, lecithin, and phytin were used, but these did not give any better results than inorganic phosphates. A low phosphorus intake is prejudicial to growth; increase of phosphorus chiefly leads to skeletal growth. There is no evidence of the synthesis of nuclein and other organic phosphorus compounds from inorganic phosphates.

W. D. H.

**Changes of Phosphatic Nutrients in the Human Body.** E. Koch (*Bied. Zentr.*, 1908, **37**, 858; from *St. Petersburg Med. Woch.*, 1906, 400—402).—In general, inorganic and non-protein phosphorus is not utilised. It is possible, however, that inorganic phosphorus may be utilised if organic phosphorus is excluded from food for a long time.

N. H. J. M.

**The Importance of Chlorides in the Life Processes of the Organism.** Hermann Friedrich Grunwald (*Zentr. physiol.*, 1908, **22**, No. 16, reprint).—Rabbits were fed on a chlorine free diet, and then excreted urine which was almost chlorine-free. After administration of diuretin, however, large quantities, 1 gram or more, of sodium chloride were excreted. After four or five doses, the animals exhibited characteristic symptoms of poisoning—weakness, shivering, paresis of the hind limbs, and gradually increasing paralysis, terminating in death in four or five days. The chlorine in the blood sank to a half or even a third of the normal, and in the latter stages of the poisoning, re-administration of chlorine was ineffective in saving the animal. Control animals which had received 1 gram of sodium chloride with the diuretin kept perfectly healthy. The toxic symptoms are therefore due to loss of chlorine, to which von Wyss has ascribed the effects of sodium bromide poisoning, which produces similar symptoms.

S. B. S.

**Influence of High Body-temperature on the Decomposition of Sugar in the Animal Body.** Hermann Hohlweg and F. Voit (*Zeitsch. Biol.*, 1908, **51**, 491—510).—An elevation of the body-temperature to over 40° by artificial means (warm chamber) leads to an increase in the metabolism of protein, and an increased excretion of nitrogen. This may be lessened or prevented if a sufficient amount of carbohydrate is also administered. Respiratory ventilation is enormously increased, and the excess of combustion falls on the sugar. This occurs also if the sugar is given subcutaneously, and even if sugars (such as sucrose) which are burnt with difficulty under normal conditions are chosen.

W. H. D.

**Chemistry of the Brain.** A. Rieländer (*Chem. Zentr.*, 1908, ii, 1371; from *Zentr. Physiol.*, 1908, **22**, 377—380).—The basic constituents precipitable by phosphotungstic acid were investigated after hydrolysis by hydrochloric acid. Histidine, arginine, lysine, and choline were obtained; also bases with a heavier molecule than choline.

W. H. D.

**Chemico-physical Investigations on the Crystalline Lens.** Filippo Bottazzi and Noè Scalinci (*Atti R. Accad. Lincei*, 1908, [v], **17**, ii, 566—571. Compare this vol., ii, 71).—When the crystalline lens of a dog or rabbit is suspended in dry air, it loses in weight rapidly for four to six hours and then slowly. Notwithstanding the great loss in weight, which amounts to 30·42—49·25% in four hours, the lens does not become opaque, but only wrinkles, so that the opacity of the lens is not due to desiccation alone. When the desiccated lens is immersed in water vapour, it increases in weight very slowly, the original weight of the lens not being attained even after eighty to ninety hours; in some cases, a slight loss in weight occurs during the first few hours of immersion in water vapour. When the desiccated lens is immersed in water, the increase in weight is rapid during the first two hours, after which time the water is only taken up very gradually. T. H. P.

**Physiology of Glands. X. The Liver in Different Nutritive Conditions.** LEON ASHER and PAUL BOEHM (*Zeitsch. Biol.*, 1908, **51**, 409—434).—Feeding on protein, proteoses, and amino-acids (alanine and aspartic acid) increases the size of the liver cells; the most marked effect was obtained with proteoses. Feeding with fat causes the appearance of fat globules in the cells. Feeding with the proteins, and especially with proteoses, leads, not only to an increase in the size of the cells, but to appearances which are figured, showing they have been stimulated to activity. Alanine and aspartic acid do not seem to act as stimuli in the same way. The view that proteoses are absorbed in part as such is supported. W. D. H.

**Salts of Muscle.** FUMIHIKO URANO (*Zeitsch. Biol.*, 1908, **51**, 483—490. Compare Abstr., 1907, ii, 978).—Some analytical figures are given of the total ash and proportion of sodium and potassium in the frog's sartorius before and after washing with sugar solution; this method gives the proportion of salts in the muscles themselves as distinguished from that due to the adherent blood and lymph. A discussion of Overton's views on the osmotic properties of muscle is also given. W. D. H.

**Physiological Function of the Arborescent Glands of the Female Generative Apparatus in the Cockroach.** L. BORDAS (*Compt. rend.*, 1908, **147**, 1495—1497).—The larger of the above glands secretes a milky fluid containing large numbers of minute octahedra of calcium carbonate, which serve to form the walls of the ootheca. G. B.

**Protein Bases of the Sperm and Ovaries of the Tunny Fish and their Products of Hydrolysis.** SERAFINO DEZANI (*Giorn. R. Accad. Med. Torino*, 1908, **14**, reprint).—The dried sperm of the tunny fish, after removal of the fat, was found to contain 15·87% of nitrogen, of which 20—22% is dissolved by 2% sulphuric acid in the form of a base answering to the reactions of that isolated by Ulpiani (Abstr., 1903, i, 215). On hydrolysing the base, 49·74% of the nitrogen present was accounted for as follows: 6·79% as ammonia, 3·86% as histidine, 37·02% as arginine, and 2·07% as lysine. The composition of the base present in the sperm of the tunny fish hence differs from the mean composition of the protamines in its small proportion of arginine and its large proportion of ammonia. Excepting as regards the arginine, which is always present to the extent of less than 30% in the histones, the base resembles in composition rather the latter than the protamines.

The sperm also contains a nucleic acid, which was obtained as a gelatinous, white mass, turning brownish-yellow on drying in a vacuum, and containing N 14·10% and P 3·10%; this proportion of phosphorus is lower than in any other nucleic acid known.

The dried ovaries of the tunny fish, after removal of the fat, contained 13·65% of nitrogen. Dilute sulphuric acid dissolved 4·46% of the total nitrogen in the form of a *base*, which was obtained as an amorphous, white powder, becoming oily in the air. The base dissolves sparingly in cold water and more readily in hot water, especially if acidified with sulphuric acid; it gives the biuret reaction, and Millon's reaction after the lapse of some time, and is precipitated by concentrated ammonia, picric acid, phosphotungstic acid, and platinum chloride solutions. 16·71% of its nitrogen is present as basic nitrogen, 2·23% as histidine, 0·95% as arginine, and 13·53% as lysine. The molecule of this base has a more complex composition than that of the base present in the sperm, a fact in accord with Kossel's hypothesis, according to which the male sexual cells, with their purely fecundating function, contain the more simple proteins, whilst the female cells, which have to supply nutriment to the new individuals, contain more complex protein substances.

The ovaries contain a nucleic acid, which was separated as a white powder, slightly soluble in hot water, giving an acid solution, with which lead acetate or copper acetate gives an abundant precipitate. The acid contains 13·31% of nitrogen and 9·36% of phosphorus, and is hence a true nucleic acid.
T. H. P.

**Influence of Sugars on the Secretion of Milk.** Giovanni Piantoni (*Chem. Zentr.*, 1908, ii, 1784—1785; from *Arch. Farm. sper.*, 1908, **7**, 329—336).—The subcutaneous injection of small quantities of mono- and di-saccharides in a goat produced an increase in the amount of milk secreted without altering its composition. Larger quantities lessened the secretion and the amount of sugar and fat in it, causing also polyuria and the passage of lactose into the urine; this was intensified by repeating the injection daily. Polysaccharides do not have this action.
W. D. H.

**The Variability of Milk. The Influence of the Addition of Various Salts to Fodder on the Composition and Quantity of the Milk.** Georg von Wendt (*Chem. Zentr.*, 1908, ii, 1881; from *Skand. Arch. Physiol.*, 1908, **21**, 89—145).—Sodium chloride, chalk, sodium phosphate, magnesium bromide, and calcium glycerophosphate when added to fodder do not influence in any definite way the composition of milk. Calcium hydrogen phosphate often increases the quantity of milk, and generally, to a slight extent, the calcium. The variability in the composition of the milk of cows of different breeds and in different periods of lactation is generally about the same. The protein content as lactation proceeds, in contrast to the other constituents, does not diminsh. The phosphorus, nitrogen, and caseinogen contents are the least variable; then come calcium, fat, and lactose; then chlorine, whilst potassium and albumin are the most variable constituents. S. B. S.



**Ionic Equilibrium in the Animal Organism. I. The Equilibrium of Acids and Bases in the Urine.** LAWRENCE J. HENDERSON and KARL SPIRO (*Biochem. Zeitsch.*, 1908, **15**, 105—113).—The ionisation constant of the two acids, β-hydroxybutyric acid and acetoacetic acid, which occur under pathological conditions in the urine, was determined. This was done by ascertaining the relative amount of salt and free acid which was present when a certain tint of an indicator was attained, and comparing it with the amount of free acid and salt present in another acid of which the ionisation constant is known when it gives under the same conditions the same tint. From the equation $(H)^{+} = C(HA)/NaA$, where $C$ = ionisation constant divided by the grade of dissociation of the salt, and $HA$ and $NaA$ the quantities of acid and salt present, it is possible to calculate the relative quantities of acid and salt present with different hydrogen ions. These concentrations in urine and blood have been determined under various normal and pathological conditions. As a result it was shown that in blood, even in acidosis, all, or almost all, the hydroxybutyric acid is combined as salt, whereas in urine a considerable quantity is free. The acidity of the urine prevents a large loss of alkali from the body of carnivora, and the kidneys possess the capacity of holding back about half the alkali when it exists in the form of salts of those acids which occur in diabetes. S. B. S.

**The Physiological Basis of Radium Emanation Therapeutics.** F. NAGELSCHMIDT and F. L. KOHLRAUSCH (*Biochem. Zeitsch.*, 1908, **15**, 123—163).—The radioactivity of urine and fæces of patients after ingestion of radioactive solutions was determined, also that of the liver, bile, and blood of rabbits. The following conclusions were arrived at: The radium emanation is a gas, which can be resorbed by the lungs, stomach, and alimentary canal, but not under ordinary conditions by the skin. The greatest part of this gas leaves the system within a relatively short space of time, chiefly in the expired air; a small quantity can be detected in the fæces, and also minute traces in the liver and bile, probably existing here as residual activity. The blood showed no radioactivity, but it is possible that the gas is evolved from this fluid only in a vacuum. The therapeutic significance of these results is discussed. S. B. S.

**Elimination of Radium Bromide [in the Organism].** A. JABOIN and BEAUDOIN (*J. Pharm. Chim.*, 1909, [vi], **29**, 15—23).—The elimination of radium by the animal organism was studied; 0·05 mg. of radium bromide given in solution to a rabbit by the mouth was wholly eliminated in four days. G. B.

**Lecithin, Choline, and Formic Acid.** GIUSEPPE FRANCHINI (*Chem. Zentr.*, 1908, ii, 1785; from *Arch. Farm. sper.*, 1908, **7**, 371—399).—In rabbits fed on lecithin, the amount of this substance increases in the liver and muscles, but not in the brain; this goes on for two weeks after the administration of lecithin ceases. Small quantities of glycero-phosphoric acid pass into the urine, also formic acid, but not choline. In the fæces, the amount of lecithin increases; glycero-phosphoric acid increases in the liver and muscles. W. D. H.

**Elimination of Nitrogen after the Administration of Glycine, Asparagine, and Glycyl-glycine Anhydride.** PHŒBUS A. LEVENE and P. A. KOHN (*Amer. J. Physiol.*, 1909, **23**, 324—343).—This is a contribution to the attempts now being made to determine the *rôle* played by individual cleavage products of the protein molecule. If glycine is given, the increase of excreted nitrogen begins earlier than when protein is administered; all the glycine nitrogen is removed as urea within twenty-four hours. Asparagine more nearly approaches protein in its behaviour, where nitrogen retention may last seventy-two hours. Asparagine also is not so rapidly absorbed as glycine. On the hypothesis that the slow excretion was due to the $CO\cdot NH_2$ group in asparagine, glycyl-glycine anhydride, which contains two $CO\cdot NH$ groups, should be eliminated more slowly still; the experiment was frustrated by the death of the dog, but there was no evidence that there was any change into glycine or urea. W. D. H.

**The Effect of Muscular Work on the Excretion of Endogenous Purines.** ERNEST L. KENNAWAY (*J. Physiol.*, 1908, **38**, 1—27).—During unaccustomed muscular work, the output of uric acid is lessened, whilst that of purine bases is increased, the total output of purine substances being about normal. A greatly increased output of uric acid follows the work. If the work is repeated, the changes noted show a progressive diminution, but they reappear when another kind of muscular exercise is taken up. The increase in purine bases is attributed to defective oxidation, but is not modified by inhalation of oxygen. The output of these bases exhibits diurnal variations similar to, but less marked than, those which occur in connexion with uric acid. The amount of the latter tends to vary inversely, and that of the bases directly, with the volume of the urine. The experiments are considered to support Leathes' contention that muscular work leads to an increased formation of uric acid. W. D. H.

**The Purine Substances Normally Excreted in Man (when neither Tea nor Coffee have been taken).** The late MARTIN KRÜGER (*Biochem. Zeitsch.*, 1909, **15**, 361—364).—In the urine of a patient who entirely abstained from tea and coffee, the three known methyl derivatives of xanthine usually found in urine, *l*-methylxanthine, heteroxanthine, and paraxanthine, were absent. Guanine was also absent, but xanthine, adenine, and epiguanine were present. Hypoxanthine was absent, and this fact is accounted for by the circumstance that a modified method of isolating the bases was employed, which is described in detail, in which a change of adenine into hypoxanthine does not take place. The results account for the origin of the methylated purine derivatives in urine. S. B. S.

**The Excretion and Detection of Atoxyl in the Urine.** GEORG LOCKEMANN and MARTIN PAUCKE (*Chem. Zentr.*, 1908, ii, 1542—1543; from *Deutsch. med. Woch.*, 1908, **34**, No. 34).—Gadamer's statement (*Apoth. Zeit.*, **22**, 566) that atoxyl is not decomposed by hydrogen sulphide is only correct in a limited degree. If the gas is passed through the heated solution acidified with hydrochloric acid, arsenic is precipitated quantitatively. In the presence of strong hydrochloric acid at 0°, hydrogen sulphide also produces a precipitate, which is probably *p*-aminophenylarsenic sulphide, $NH_2\cdot C_6H_4\cdot AsS_2$, or a similar compound. Also in neutral hot solutions, hydrogen sulphide causes a precipitate. If the atoxyl compound is warmed with sulphur dioxide until all the latter is driven off, hydrogen sulphide then causes a yellow precipitate at the ordinary temperature.

Atoxyl preparations are very inconstant in composition; this is not only due to variations in water of crystallisation, but to other compounds mixed with the atoxyl. Atoxyl can be detected by Ehrlich and Bertheim's reaction (Abstr., 1907, i, 812) either in water or in urine. In water 1 mg. in 100 c.c. can be detected; the delicacy of the test in urine is less.

After subcutaneous injection, atoxyl is rapidly excreted in the urine almost wholly unchanged. If the injections are repeated, traces are found for a week afterwards; a small amount of cleavage occurs in the body, as shown by the presence of "free" arsenic in traces in the urine. Later, a certain amount is taken up and bound in the organism, and finally excreted with keratin. W. D. H.

**The Diazo-reaction of Normal Urine.** R. ENGELAND (*Chem. Zentr.*, 1908, ii, 1273—1274; from *Münch. med. Woch.*, 1908, **55**, 1643—1645).—The statement of Penzoldt and Petri (*Berl. klin. Woch*, 1883; *Zeitsch. klin. Med.*, 1884) that normal urine gives Ehrlich's diazo-reaction is confirmed. It is attributed to substances, such as histidine, which contain an imino-azo-nucleus, and the absence of the reaction in many normal urines is attributed to the presence of such substances as creatinine, which unite with imino-azo-compounds. In certain pathological conditions, the excretion of the last-named substances is increased. W. D. H.

**A Simple Apparatus for the Cryoscopy of Urine.** ERWIN RUPP (*Chem. Zentr.*, 1908, ii, 1536—1537; from *Apoth. Zeit.*, 1908, **23**, 714).—A form of apparatus suitable for rapid freezing-point estimations with urine. W. D. H.

**Hydrochloric Acid Content of Gastric Juice in Anchylostomiasis, with Special Reference to its Relationship to Anæmia and Appetite.** TANZO YOSHIDA (*Chem. Zentr.*, 1908, ii, 1950; from *Arch. Schiff's. Tropenhyg.*, 1908, **12**, 683—697).—The acidity of the gastric juice in Japanese and also in Chinese varies between 45 and 49 degrees of acidity with 0·09—0·17% HCl. In anchylostomiasis these figures remain normal; the juice was rarely subchlorhydric, and still more rarely hyperchlorhydric. The proportion of free hydrogen chloride decreases when anæmia becomes more intense, and the appetite in anchylostomiasis is closely connected with this. G. B.

**Experimental Glycosuria. IV. Cause of the Hyperglycæmia Produced by Asphyxia.** JOHN J. R. MACLEOD (*Amer. J. Physiol.*, 1909, 23, 278—302).—Hyperglycæmia lasts some time after asphyxiation. The source of the sugar is the hepatic glycogen, for after extirpation of the liver, hyperglycæmia does not occur. The same is true for the hyperglycæmia produced by curare. The asphyxial (and curare) blood acts directly on the liver cells, for the usual results take place after the hepatic nerves are cut. The substance in the blood considered to be responsible for the action is carbon dioxide, and not loss of oxygen. W. D. H.

**Toxicology of Nickel Carbonyl.** H. W. ARMIT (*J. Hygiene*, 1909, 8, 565—600).—The lethal dose of nickel varies according to the animal employed and the method of administration. In the form of nickel carbonyl the conditions for rapid absorption are most favourable, and rabbits die after 3—4 mg. per kilo. of body-weight, and cats after 8·5 mg.

When the gas is breathed, nickel, probably as hydrated basic carbonate, is deposited on the respiratory surface, from which it is taken up by the lymph and blood. It is thus carried to the tissues and deposited there, especially in the brain and adrenals. The histological appearances produced are figured; there is endothelial degeneration, fatty degeneration of the vessel walls and adrenals, and possibly a primary action on the brain cells. Hæmorrhages and other secondary results follow. Nickel is excreted by the kidneys and intestine. Iron-carbonyl produces very similar results, but the fatal dose is larger; cobalt occupies an intermediate position in toxicity. No treatment was found to avert death. W. D. H.

**Chemical Constitution and Physiological Activity of Acids.** JACQUES LOEB (*Biochem. Zeitsch.*, 1909, 15, 254—271).—The physiological activity was determined by ascertaining the strengths of various acids necessary to produce a fertilisation membrane in the eggs of sea-urchins. A number of eggs were immersed in solutions of the acids of varying strengths in sodium chloride solution isotonic with sea-water for definite intervals, then transferred back again to sea-water, and the percentage of eggs which had formed membranes determined in each case. It was found in the case of the fatty monobasic acids that the larger number of carbon atoms they contained the more active were they as membrane producers. The hydroxy-acids were less active than the corresponding unsubstituted acids; the polybasic acids were less active than the monobasic. The mineral acids were also less active than organic acids. The conclusion is drawn that the first action of the acids is to penetrate the cell-membranes, and this is a function of the undissociated acid as a whole, and not of the hydrogen ions. The hydrogen ions appear, however, to inhibit the formation of the membrane, as this takes place only after the eggs are transferred back to sea-water after immersion in the acid. S. B. S.

**Is Phenolphthalein Split in the Body?** C. FLEIG (*Chem. Zentr.*, 1908, ii, 1374; from *Bull. Sci. Pharmacol.*, 1908, **15**, 381—384. Compare Abstr., 1908, ii, 313).—Various organs of the dog were perfused with a solution of phenolphthalein. The amount was the same after as before perfusion, except in the case of the kidney, where it was slightly lessened. W. D. H.

**Influence of the Asymmetric Carbon Atom in Pharmacology. The Action of *d*-, *r*-, and *l*-Camphor on the Chloral-poisoned Frog's Heart.** JUHO HÄMÄLÄINEN (*Chem. Zentr.*, 1908, ii, 1451; from *Skand. Arch. Physiol.*, 1908, **21**, 64—79).—The three modifications of camphor have no action on the normal frog's heart. They, however, stimulate the heart's action after this has been lessened by chloral. The action of the three kinds of camphor is pretty equal, but that of the *l*-variety is least. W. D. H.

**Chemical Examination and Physiological Action of Nutmeg.** FREDERICK B. POWER and ARTHUR H. SALWAY (*Amer. J. Pharm.*, 1908, **80**, 563—580).—The narcotic action of nutmeg is generally attributed to myristicin, but owing to the fact that the action of nutmeg itself is much more pronounced than that of an equivalent quantity of pure myristicin, it was considered desirable to make a complete investigation in order to ascertain if other substances are present which contribute to the effect.

The essential and expressed oils of nutmeg have already been studied (Trans., 1907, **91**, 2037; 1908, **93**, 1653). An examination of the "press-cake" has revealed the presence of the following substances which were not identified in either of the oils: dextrose, tannic acid, colouring matters, resins, and a very small quantity of ipuranol (Trans., 1908, **93**, 907; Abstr., 1908, ii, 725).

The results of a physiological investigation have shown that the narcotic property of nutmeg is undoubtedly due to myristicin, but have indicated that this substance when associated with the other constituents is in a more favourable condition for absorption than when it is in a pure state. E. G.

**Absorption, Excretion, and Destruction of Strophanthine.** ROBERT A. HATCHER (*Amer. J. Physiol.*, 1909, **23**, 303—323).—The absorption of strophanthine is rapid even from ligatured loops of intestine. Absorption when the drug is given by the mouth (in man and dog) is, however, comparatively slow, and with small doses, excretion keeps pace with it, so that a large dose has to be given to produce toxic effects. The amount destroyed in the alimentary canal is small. It can, in the rat, be detected subsequently in all the tissues. The oral administration of strophanthine is regarded as therapeutically irrational. W. D. H.

**Influence of Iodothyrin, Spermine, and Adrenaline on Oxidation Processes, and on the Toxicity of the Urine.** A. J. JUSCHTSCHENKO (*Biochem. Zeitsch.*, 1909, **15**, 365—452).—In mental diseases the toxicity of the urine varies, being sometimes increased, sometimes lessened. It is stated that similar variations are produced in animals, accompanied by changes in gaseous metabolism, by the administration of iodothyrin, spermine, and adrenaline, or by the extirpation, partial or complete, of the glands which produce these substances. W. D. H.

**Behaviour of "Bromoglidin" in the Organism.** HEINRICH BORUTTAU (*Chem. Zentr.*, 1908, ii, 1742; from *Deutsch. med. Woch.*, 1908, **34**, 1883—1884).—The bromine of "bromoglidin" is secreted in a similar manner to the bromine of potassium bromide, except that secretion is increased. The physiological action appears also to be greater than is indicated by the bromine content.

J. V. E.

**Effect of Magnesium on Some of the Toxic Effects of Eserine.** DON R. JOSEPH (*Amer. J. Physiol.*, 1909, **23**, 215—225).—Although magnesium salts have no influence on eserine myosis, they have a certain value as an antidote in eserine poisoning; thus they abolish the muscular tremor produced by eserine.

W. D. H.