Physiological Chemistry.

Influence of the Medium of the Respiration of Living Cells. W. RYFFEL (*Z. physiol. Chem.*, 1923, **129**, 223—247).—The respiratory activity of the living cell measured by the reduction of *m*-dinitrobenzene to *m*-nitrophenylhydroxylamine is greatest at a concentration of PO_4''' of 0·08—0·09 M., at p_H 9—10, and at a temperature, in the case of guinea-pigs and pigeons, of about 40°, and of frogs of between 20° and 35°. W. O. K.

The Effects on the Circulation and Respiration of an Increase in the Carbon Dioxide Content of the Blood in Man. E. C. SCHNEIDER and DOROTHY TRUESDELL (*Amer. J. Physiol.*, 1922, **63**, 155—175).—Among the physiological effects observed on gradual increase of the amount of carbon dioxide in inspired air were an increased pulse rate; increased arterial, capillary, and venous blood pressures; increased minimum volume and frequency of breathing. CHEMICAL ABSTRACTS.

The Respiratory Exchange and Blood-sugar Curves of Normal and Diabetic Subjects after Epinephrine [Adrenaline] and Insulin. RICHARD S. LYMAN, ELIZABETH NICHOLLS, and WM. S. MCCANN (*J. Pharm. Expt. Ther.*, 1923, **21**, 343—365).—Investigations are described on the effect of administration of adrenaline and of insulin on the respiratory quotient, heat production, blood-sugar, pulse rate, and blood pressure of normal and of diabetic patients. Adrenaline was found as usual to increase the respiratory quotient, heat production and the blood-sugar, whilst insulin increased the respiratory quotient and the heat production but diminished the blood-sugar. Insulin and adrenaline, when injected together, have, generally speaking, an additive effect. W. O. K.

The Effect of Parasympathetic Stimulation, especially by Means of Choline, on the Blood-sugar. K. DRESEL and H. ZEMMIN (*Biochem. Z.*, 1923, **139**, 463—469).—The subcutaneous and oral administration of choline to normal and diabetic subjects produced a diminution in blood-sugar, minimal values being reached in from one-half to two hours in the former, and in from two to four hours in the latter method of administration. This is ascribed to parasympathetic stimulation. The results of Bornstein and Vogel (A., 1922, i, 80), who observed an increase of blood-

sugar on parasympathetic stimulation using pilocarpine and physostygmine, are ascribed to the unsuitability of the stimulants.
J. P.

The Reversibility of Fibrin Coagulation. II. G. Barkan and Adalbert Gaspar (*Biochem. Z.*, 1923, **139**, 291—301).—Fibrin obtained from untreated blood plasma, in contrast to that obtained from oxalated or fluoride plasma, has no tendency to dissolve in 0·02% sodium hydroxide. If the insoluble fibrin be subsequently treated with 0·2% sodium oxalate or 0·75% sodium fluoride, it becomes, in part, soluble in dilute alkali. These results, in conjunction with the authors' previous work (*Biochem. Z.*, 1923, **136**, 411), are regarded as opposing the view that fibrin coagulation is reversible. J. P.

Effect of Coagulation on the Amino-nitrogen Content of Blood. F. Petitjean (*Compt. rend. Soc. Biol.*, 1923, **87**, 1001—1004; from *Chem. Zentr.*, 1923, i, 1464—1465).—In the coagulation of blood a small initial decrease in the amino-nitrogen content is followed by an increase. The content after complete coagulation almost approximates to the original amino-nitrogen content. In certain cases, an increase is observed. G. W. R.

Amino-acids of the Blood. I. Behaviour during Digestion. II. On Prolonged Fasting. S. Marino (*Arch. Farm. sperim. Sci. aff.*, 1923, **36**, 20—32, 56—64).—I. The defibrinated blood of a fasting dog is found to contain from 3·3 to 6·6 mg. of amino-acids per 100 c.c. When proteins are undergoing digestion, the blood sometimes contains less than the normal proportion of amino-acids, but in other cases shows almost double the proportion present during fasting. In general the content tends to resume its normal value after the digestion of protein has proceeded for six hours.

II. If fasting is prolonged to the death of the animal, the blood exhibits a considerable increase in amino-acid content, although different animals show marked variations in this respect. Such increase, which is manifested almost exclusively after the twelfth day of fasting, is subsequently progressive until death ensues. In the latter stage, the proteins are probably hydrolysed so rapidly that the resulting amino-acids cannot be utilised and consequently accumulate in the blood; this effect may be aggravated by the pronounced autolytic changes and by the inefficiency of the regulating mechanism. T. H. P.

The Blood of Mother and Fœtus. M. G. Howe and M. H. Givens (*Amer. J. Diseases Children*, 1923, **25**, 63—75).—The non-protein nitrogen and urea-nitrogen in maternal blood at parturition are normal. The values vary but there is no consistent preponderance in either blood. Differences are attributed to maternal or fœtal renal insufficiency or impairment of placenta. The concentration of blood uric acid of parturient women tends to be higher than normal. The concentration of blood-sugar is temporarily increased at parturition, maternal values being greater

than fœtal. This is due to the anæsthetic, to muscular contractions, and possibly to a psychic factor. CHEMICAL ABSTRACTS.

The Distribution of Urea in Human Blood and in Secretions. J. BERNARD COHEN (*Biochem. Z.*, 1923, **139**, 516—526).—Using the urease method and estimating the evolved ammonia in a micro-Kjeldahl apparatus, urea determinations were made on whole human blood and on plasma. In twelve recorded normal cases only three showed an equilibrium distribution of urea between corpuscles and plasma. In the other cases, the ratio corpuscle urea : plasma urea varied from 0·5 to 2·1. Similar results were obtained in eight cases of uræmia, and these were confirmed in dogs with high blood ureas produced by ligation of the pancreatic duct. Human bile, duodenal juice, and cerebrospinal fluid all contain less urea than the corresponding blood, and in the case of bile the urea content is higher during fasting than when food is being taken. J. P.

The Origin of the Lipase in Blood. KEIZO HIRUMA (*Biochem. Z.*, 1923, **139**, 336—341).—Ligation of the pancreatic duct in dogs caused an increase of lipase in the blood, the maximum increase being reached after four days. In eight to nine days the lipase content had returned to normal, due to the lessened activity of the secreting cells following on the ligation. No lipase appeared in the urine. Blood-serum collected from the pancreatico-duodenal vein contained more lipase than that from the portal vein, which in turn showed a higher content than that from the femoral artery and vein. These observations are taken to indicate the pancreas and intestine as the seat of origin of blood lipase, but this view does not accord with the results of Rona and Pavlović (this vol., i, 403) on the action of quinine and atoxyl on various lipases. J. P.

Antihæmolytic Effect of Antithrombin. NICOLAS L. COSMOVICI (*Compt. rend. Soc. Biol.*, 1923, **88**, 538—540; from *Chem. Zentr.*, 1923, i, 1520).—Antithrombin from the serum of rabbits was found to exert an antihæmolytic effect on a mixture composed of sheep blood-corpuscles and guinea-pig complement in sodium chloride solution. The effect is intensified by the alkalinity of the liquid containing the antithrombin. G. W. R.

The Cholesterol Balance. S. J. THANNHAUSER (*Deut. arch. Klin. Med.*, 1923, **141**, 290—311; from *Chem. Zentr.*, 1923, i, 1403—1404).—[With W. FLEISCHMANN.]—An enzyme which hydrolyses cholesterol esters was shown to be present in duodenal juice, pancreatic solution, and bile.

[With E. ANDERSEN.]—Cholesterol is estimated in total blood and in serum by the gravimetric method of Windaus after addition of anhydrous calcium sulphate and ether.

[With ECARIUS.]—The equilibrium between free cholesterol and cholesterol in the form of esters is held to be due to the function

of organs, in particular the liver, and not to a specific enzyme in the blood.

[With PAUL VON MILLER, H. SCHABER, and C. MONCORPS.]—Experiments are described on the cholesterol balance with diets low in cholesterol and fat. G. W. R.

Tetany. I. The Effect of Calcium Chloride Ingestion on the Acid–Base Metabolism of Infants. J. L. GAMBLE, G. S. Ross, and F. F. TISDALL (*Amer. J. Diseases Children*, 1923, **25**, 455—469).—Ingested calcium chloride behaves as an acid substance since the concentration of the chloride-ion absorbed is greater than that of the calcium-ion. The effect on acid–base metabolism of the ingestion of 1 g. of calcium chloride is equivalent to that of the ingestion of milk containing 75 c.c. of 0·1*N*-hydrochloric acid. This increase in acid over fixed alkali claiming excretion in the urine is compensated by an increase in urinary acidity and ammonia excretion resulting in a normal base concentration of blood plasma. The lowering of hydrogen carbonate following calcium chloride ingestion is due to a rise in chloride-ion concentration displacing an equivalent amount of bound carbon dioxide. Excretion of fixed alkali, especially of sodium and potassium in the urine, is increased following ingestion of calcium chloride, in consequence of a reduction in the volume of body-water rather than by actual withdrawal of base from body fluids. CHEMICAL ABSTRACTS.

Tetany. II. The Effect of Ingestion of Hydrochloric Acid-producing Substances on the Acid–Base Metabolism of an Infant and the probable manner of their Action in the Treatment of Tetany. J. L. GAMBLE and G. S. Ross (*Amer. J. Diseases Children*, 1923, **25**, 470—497).—Plasma bicarbonate is lowered following the administration of calcium chloride, ammonium chloride, and hydrogen chloride to an infant with tetany, in consequence of an increased metabolism of hydrogen chloride which produces an abnormally high chloride-ion content of the plasma at the expense of bicarbonate; the total base of the plasma remains stationary. The hydrogen-ion concentration of the plasma is considerably increased. The metabolism of these substances leads to an increased excretion of phosphates and of fixed alkali in the urine in consequence of a reduction of the volume of body-water due to diuresis. Ammonium chloride does not raise the lowered calcium content of the plasma found in tetany, its therapeutic action being ascribed to the production of an increased ionisation of calcium; calcium chloride and hydrogen chloride, however, cause in addition an increase in the calcium content of the plasma. CHEMICAL ABSTRACTS.

Retention of Bismuth by the Brain. P. LEMAY and L. JALOUSTRE (*Compt. rend. Soc. Biol.*, 1923, **88**, 474; from *Chem. Zentr.*, 1923, i, 1517).—Comparatively large amounts of bismuth were found in the brains of two individuals to whom bismuth hydroxide had been administered. G. W. R.

The Metabolism of Phosphorus of the Nervous System. II. Phosphorus Content under Various Conditions. ELISABETH HECKER (*Z. physiol. Chem.*, 1923, **129**, 26—32).—The phosphorus content of the surviving central nervous system of the frog kept in isotonic sodium chloride solution and supplied with oxygen shows a decrease of about 15—16%. This decrease occurs almost entirely during the first eight hours. This loss of phosphorus is decreased by the application of a narcotic such as urethane, and is increased by electrical excitation, and there is no decrease if oxygen is excluded. W. O. K.

The Metabolism of Phosphorus of the Nervous System. III. The Phosphorus-sparing Substances in the Metabolism of the Central Nervous Organs. ELISABETH HECKER (*Z. physiol. Chem.*, 1923, **129**, 205—219).—At rest or under stimulation the phosphorus content of the central nervous system decreases, but the presence of galactose, lævulose, or of cerebrin reduces this loss. In the presence of brain lecithin, there is practically no loss. Neutral phosphate solutions also cause a decrease of the loss of phosphorus, but the best effect is obtained by a combination of phosphates and brain lecithin. The temperature influences the magnitude of the changes and so also, in the case of the stimulated preparation, does the strength of the stimulation. W. O. K.

The Metabolism of Phosphorus of the Nervous System. IV. The Phosphorus Metabolism of the Peripheral Nerves. ELISABETH HECKER (*Z. physiol. Chem.*, 1923, **129**, 220—222).—A nerve (ischiadicus) of the frog contains about 0·2% of phosphorus (calculated on the fresh substance). No change in the phosphorus content could be detected in the resting nerve, but under stimulation it decreased by about 10% in eight hours. W. O. K.

The Free Sugar Content of the Liver and its Relation to Glycogen Synthesis and Glycogenolysis. CARL F. CORI, G. T. CORI, and G. W. PUCHER (*J. Pharm. Expt. Ther.*, 1923, **21**, 377—389).—Under normal conditions, glycogen is synthesised in the liver when the free liver-sugar is high, but if insulin is administered, glycogen synthesis takes place at a much lower level of liver-sugar. Adrenaline causes glycogenolysis and the free liver-sugar is increased. W. O. K.

The Biological Decomposition of Uric Acid. H. STEUDEL and S. IZUMI (*Z. physiol. Chem.*, 1923, **129**, 188—194).—An extract prepared from finely divided ox-kidneys, which in the presence of oxygen converted uric acid into allantoin, was unable to form allantoin from uroxanic acid, $(NH_2{\cdot}CO{\cdot}NH)_2C(CO_2H)_2$. W. O. K.

Composition of a Cystic Liquid. E. MAURIN (*Ann. Chim. Analyt.*, 1923, [ii], **5**, 207—208).—A scrotal cyst yielded 155 c.c. of a slightly turbid, pink liquid, *d* 1·007. The liquid contained: total solids, 1·235%; ash, 1·062%; serine, 0·135%; globulin, 0·015%; nucleoalbumin, trace; peptone, none; pseudomucin, none; urea, 0·075%; dextrose, none; cholesterol, trace; chlorides (as NaCl), 0·012%; phosphates (as P_2O_5), 0·020%. W. P. S.

Composition of Cyst Fluid (of Cattle). P. Mazzocco (*Compt. rend. Soc. Biol.*, 1923, **88**, 342—343; from *Chem. Zentr.*, 1923, i, 1334).—The colourless, transparent cyst fluid from cattle rarely becomes turbid on being heated. It has *d* 1·006—1·009. The reaction is alkaline to litmus, acid to phenolphthalein in the cold, and alkaline on warming. The total alkalinity to sulphuric acid is 0·010—0·018%. The composition is as follows: Na_2O, 0·53%; K_2O, 0·04—0·05%; CaO, 0·005—0·006%; Fe, trace; MgO, 0·005—0·007%; NaCl, 0·668—0·700%; SO_3, 0·35—0·43%; P_2O_5, 0·026—0·030%; SiO_2, trace; dextrose, 0·03—0·4%; glycogen, trace; total fatty acids, 0·036—0·041%; unsaponifiable acids, 0·01—0·015%; cholesterol, 0·003—0·004%; proteins, 0·09—0·15%; total nitrogen, 0·069—0·080%; non-protein nitrogen, 0·034—0·040%; carbamide nitrogen, 0·025—0·028%; amino-acids, 0·025—0·028%; histidine, 0·0024—0·010%. The blood of the same animals contains twice as much dextrose and approximately the same amount of carbamide nitrogen and non-protein nitrogen.

G. W. R.

The Influence of Various Antipyretics on the Distribution of Nitrogen in the Urine. Kiyoshi Morinaka (*Z. physiol. Chem.*, 1923, **129**, 111—129).—The effect of antipyretics on the various fractions of the nitrogen content of urine (rabbit, dog, and man) varies according to the particular drug used. Some, such as antifebrin, have little influence; others, such as elbon or phenacetin, cause amongst other effects, increased amino-acid nitrogen, probably to be associated with increased protein decomposition. The drugs investigated were elbon (cinnamoylhydroxyphenylcarbamide), phenacetin, sodium salicylate, aspirin, quinine, remigin (ethylhydrocupreine), antipyrine, pyramidone, and antifebrin.

W. O. K.

Distribution and Elimination of Organic Arsenic Compounds after Intravenous Administration. F. M. R. Bulmer (*J. Pharm. Expt. Ther.*, 1923, **21**, 301—311).—After intravenous administration of salvarsan, arsenic first of all accumulates in the liver, but it disappears rapidly from that organ, being excreted in the bile, which seems to be the main route by which the organism eliminates arsenic. It also tends to accumulate in the lungs, where it remains for several days, whilst it is retained in the long bones for a longer period than in any of the other tissues analysed.

W. O. K.

Penetration of Arsenic into the Cerebrospinal Fluid. Carl Voegtlin, M. I. Smith, Helen Dyer, and J. W. Thompson (*U.S. Public Health Repts.*, 1923, **38**, 1003—1021).—The penetration of arsenic into the cerebrospinal fluid, following the intravenous injection of a variety of arsenicals, has been studied by (*a*) the chemical analysis of the blood, brain, and cerebrospinal fluid for the presence of arsenic, and (*b*) the parasiticidal action obtainable in the cerebrospinal fluid. The distribution of arsenic in various tissues and body-fluids after injection of several preparations has also been studied. Normal rabbits fed on oats and kale contained 0·69 micro-mg. of arsenic per g. of cerebrospinal fluid. The brain of

normal animals contained an average of 0·02 micro-mg. arsenic per g. of fresh tissue. *Trypanosoma equiperdum* is killed in blood suspension in vitro by 7·5 micro-mg. of arsenic from "arsenoxide," in six minutes. Salvarsan, neo-salvarsan, and silver salvarsan have a relatively low effectiveness unless very large doses are used. Sulpharsphenamine is the most effective arsenobenzene derivative studied. A greater therapeutic effect can be expected from large single doses given at long intervals than from smaller doses administered more frequently. Sulpharsphenamine, tryparsamide, and 3-amino-4-hydroxyphenylarsinic acid are suggested as remedies of superior penetrative power. CHEMICAL ABSTRACTS.