ence book with its wealth of information and the emphasis laid upon influences of errors. It is, of course, not expected that any class should work through all the experiments described, but that the teacher will make a selection from them.

The book is distinctly for undergraduate instruction, including the most elementary exercises given in any physical laboratory. Probably on account of its elementary character no measurements of dielectric constants and no experiments in atmospheric electricity or with electric waves are given.

While a manual of the "American" type, as Sabine's, seems more suited for beginners in laboratory work, especially in our colleges where large classes must be handled by one instructor, Watson's text-book would be particularly suited for a course in which not all time is spent in practical work, but where some collateral reading is required. Any student specializing in physics ought to be acquainted with the contents of the book.

K. E. Guthe

The State University of Iowa

Societies and Academies

Society for Experimental Biology and Medicine

Twenty-second Meeting

The twenty-second meeting of the Society for Experimental Biology and Medicine was held at the Rockefeller Institute for Medical Research, on Wednesday evening, April 17. The president, Simon Flexner, was in the chair.

Members present—Auer, Beebe, Burton-Opitz, Calkins, Carrel, Emerson, Ewing, Field, Flexner, Gibson, Gies, Hatcher, Kast, Levene, Loeb (L.), Meltzer, Morgan, Noguchi, Richards, Salant, Shaffer, Teague, Torrey, Wadsworth, Wallace, Wolf, Wood.

Members elected—R. R. Bensley, William T. Councilman, Ludwig Kast, Waldemar Koch, W. J. MacNeal, F. P. Mall, T. Brailsford Robertson, Oscar Teague, Richard Weil.

Abstracts of the Communications[2]

Wounds of the Pregnant Uterus: Leo Loeb.

Experiments were carried out on twenty-six guinea-pigs at different stages of pregnancy. Wounds were made in various directions in the uterus, or part of the wall of the uterus was inverted so that the mucous membrane was turned outside. It was found that at a certain stage of pregnancy, namely, from the fourth to the sixth day, nodules of decidual tissue were formed at places where the continuity of the uterus had been interrupted or where the mucous membrane had been inverted. Serial sections of these nodules showed that they consisted of typical decidual tissue, which did not include a developing ovum. Between the third and fourth weeks after impregnation, such nodules became necrotic.

These experiments were also of interest in seeming to show that under ordinary conditions it is not possible to produce an abdominal pregnancy in the guinea-pig by various injuries of the uterus.

The Effect of Light on the Staining of Cells: Leo Loeb.

In solutions of dyes (neutral red, eosin, methylene blue, methyl violet and others), cells (eggs of Asterias) are stained differently, according to whether the cells and solutions are exposed to the light or kept in the dark.

The difference in the staining of cells in the light and dark is caused by at least two different effects of the light. (*a*) The light causes primary changes in the cells, and the difference in the staining of cells in the light and in the dark is caused by those primary changes which the light produces in the cells. This applies to staining with eosin, neutral red, and with certain mixtures of eosin and methylene blue, and eosin and neutral red. (*b*) The light changes primarily the staining

[2] The abstracts presented in this account of the proceedings have been greatly condensed from abstracts prepared by the authors themselves. The latter abstracts of the communications may be found in Number 5 of Volume IV. of the society's proceedings, which may be obtained from the secretary.

solutions and the staining of the cells corresponds to the primary changes in the staining solution. This applies to staining with pure methylene blue and to such mixtures of methylene blue and eosin as contain much methylene blue. It also applies, perhaps, to solutions of hematoxylin. The staining of the cells in the light as well as in the dark depends also upon the proportions in which both dyes are present in the mixture.

It is possible to distinguish the two factors stated under *a* and *b* by killing the cells with heat. The effect of light upon the cells which is caused by its direct action upon them, disappears if the cells have been previously killed. The changes, on the contrary, which are secondary to the primary changes in the staining solutions still occur.

Means which diminish the oxidative processes in the cells (*e. g.*, addition of KCN) and also saturation of the solution with oxygen, do not modify markedly the differences in the staining of the cells in the light and in the dark.

The Abolition of Visceral Pain by Intramuscular Injection of Cocaine: a Demonstration: LUDWIG KAST and S. J. MELTZER.

It was shown that the intestines of a normal dog under slight ether anesthesia were not devoid of the sensation of pain and that cocaine (intramuscular injection) abolished the pain through a remote anesthetic effect.

The Effect of Nephrectomy upon the Toxicity of Magnesium Sulphate when given by Mouth: a Demonstration: S. J. MELTZER.

It was shown that in nephrectomized rabbits, magnesium sulphate produces a profound general effect even when given by mouth, and that the absence of such an effect after the usual administration of the compound is due to the comparatively prompt elimination through the kidneys of a large part of the absorbed salt, thus preventing at any given time the accumulation within the organism of a quantity equal to a toxic dose.

Observations on a Rabbit for Thirty Months after the Removal of the Superior Cervical Ganglion: S. J. MELTZER.

The left superior cervical ganglion of a full-grown gray male rabbit was removed October 14, 1904. The animal died April 23, 1907. During the last eighteen months of its life *the blood vessels of both ears were never very wide and showed but little of the usual rhythmical changes.*

After removal of the ganglion, a subcutaneous injection or an instillation of adrenalin into the conjunctival sacs of the rabbit caused dilation of the pupil on the side from which the ganglion was removed. *This biological test for the absence of the ganglion* was frequently made within the two and a half years of the animal's life and it was found that a *subcutaneous or intramuscular injection or an instillation of adrenalin invariably caused a long lasting dilation of the left pupil.* In further harmony with this proof that the ganglion was not regenerated, or at least the postganglionic and preganglionic nerve fibers did not grow together, it was found that while stimulation of the right sympathetic easily caused the usual effects upon the ear vessels and pupil of the corresponding side, *stimulation of the left cervical sympathetic caused no changes whatever in the left pupil or in the vessels of the left ear.*

During the last twelve months of the rabbit's life, the dilation of the left pupil never attained the same degree as during the earlier period. Further, an intramuscular injection of adrenalin, which in the early period caused dilation of the pupil within two or three minutes, lately developed its effect very slowly. Finally the constricting effect of eserin was only partly overcome by an injection or instillation of adrenalin, whereas in the early period the effect of eserin was completely overcome by adrenalin.

Within the last ten months the *right pupil was permanently distinctly larger than normal and responded sluggishly to light. An injection of adrenalin caused a distinct constriction,* which lasted about fifteen minutes. After the above-mentioned stimulation of the cervical sympathetics, *the permanent dilation of the right pupil disappeared for about five weeks and an injection of adrenalin had no effect upon the pupil.*

At the autopsy, no sign of a ganglion could be discovered on the left side.

Intra-abdominal Pressures: Haven Emerson.

In dogs the pressure varied from 2 to 45 mm. of water above atmospheric, *i. e.*, positive; in cats from 2 to 20 mm. positive; in rabbits from 2 to 25 mm. positive; in calves from 2 to 10 mm. positive.

The causes of this persistent but fluctuating positive pressure within the free peritoneal cavity are the tone of the muscular walls of the peritoneal cavity, including the diaphragm and the pelvic floor. The contraction of the diaphragm is the chief, if not the only factor in the normal rise in pressure during inspiration.

Debilitated states show a low pressure. Ether anesthesia causes a gradual drop in pressure until, with complete loss of muscular tone, the pressure reaches zero. Curare likewise causes a progressive fall to zero pressure. Asphyxia develops great rises in pressure during inspiration until muscular relaxation allows a drop to zero just before death.

Excessive pressure artificially produced within the peritoneal cavity causes death from cardiac failure before the obstruction to respiratory excursion has developed a marked asphyxia. The pressure is the same at all points of the peritoneal cavity, and is subject to identical variations wherever the recording trocar is placed.

The physiological function of these pressure conditions seems to be chiefly in assisting the circulation of blood and lymph, thereby playing an important rôle in the processes of absorption and elimination, which take place within the abdomen.

On the Influence of CO_2 on the Viscosity of the Blood: Russell Burton-Opitz.

The dogs used in these experiments received alternately a supply of normal air and air charged with CO_2. During the period of inhalation of the air plus CO_2 the arterial blood showed a somewhat greater viscosity than during the time when the animal breathed normal air. The changes appeared very promptly, but were never very conspicuous. The specific gravity of the blood pursued a course parallel to that of the viscosity.

Agglutinins and Precipitins in Anti-gonococcic serum: John C. Torrey.

Rabbits and other laboratory animals, when inoculated with cultures of gonococcus, raise specific agglutinins and precipitins.

Normal rabbit serums contain different amounts of agglutinin for gonococcus. Strains of gonococci differ greatly in the titer of their agglutination with various gonococcic immune serums. After one inoculation with a certain culture, a large amount of agglutinin was produced for some strains, but none for others.

Absorption experiments indicate that an anti-gonococcic serum may contain, in addition to the specific homologous agglutinins, several groups of agglutinins which act on the different cultures quite independently of one another. At least three groups were found, whose major or specific agglutinins are not removed by inter-absorptions. This indicates that as far as agglutination is concerned, there are specific differences between these groups. The family gonococcus is, accordingly, heterogeneous rather than homogeneous, and in that respect resembles the dysentery, colon and streptococcus families. In making a serum for therapeutic purposes, this fact should be borne in mind.

The passage of a culture of gonococcus through a guinea-pig caused a very marked decrease in its agglutinability. With the exception of one serum, meningococcus agglutinated only in low dilutions of the anti-gonococcic serums.

Anti-gonococcic serum contains specific precipitins for gonococcus. There appeared to be no relation between the precipitating and the agglutinating properties of an anti-gonococcic serum for a culture of gonococcus.

Anti-gonococcic serums contain, as a rule, some precipitins for meningococcus, but none for *m. catarrhalis* or *staphylococcus.*

There is evidence of a relationship between gonococcus and meningococcus, but not of as close a one as has been described by some investigators.

On the Separate Determination of Acetone and Diacetic Acid in Diabetic Urines: OTTO FOLIN.

Measure 20–25 c.c. of acetone solution or urine into an aerometer cylinder and add 0.2–0.3 gm. of oxalic acid or a few drops of 10-per-cent. phosphoric acid, 8–10 gm. of sodium chloride and a little petroleum. Connect with the absorbing bottle (as in the ammonia determination), in which has been placed water and 40 per cent. KOH solution (about 10 c.c. of the latter to 150 c.c. of the former) and an excess of a standardized solution of iodine. Connect the whole with a Chapman pump and run the air current through for 20–25 minutes. (The air current should be fairly strong, but not as strong as for the ammonia determination.) Every trace of the acetone will now have been converted into iodoform in the receiving bottle. Acidify the contents of the latter by the addition of concentrated hydrochloric acid (10 c.c. for each 10 c.c. of the strong alkali used) and titrate the excess of the iodine, as in the Messinger-Huppert method, with standardized thiosulphate solution and starch.

The estimation of the acetone can be made simultaneously with the determination of the ammonia, by the use of the same air current and even in the same sample of urine, but the author does not recommend such simultaneous determinations except for cases where the amount of available urine is small.

On Magnesium and Contractile Tissues: PERCY G. STILES.

The author extended and confirmed the findings of Meltzer and Auer. Magnesium was found to have a direct inhibitory effect on automatic tissue (plain and cardiac muscle) and a depressing effect upon the irritability of the non-automatic striped muscle. This influence is slow to wear off after the application, but seems generally to favor the longer activity of the muscle—in other words, it is conserving in character. Magnesium appears to be the element to which we may look with most reason when seeking an agent that shall suspend katabolic changes without permanently damaging living structures. It is clearly less hurtful than potassium in like concentration. Comparison of magnesium with potassium shows that the former is not so distinctly the antagonist of calcium as is the latter. It also seems probable that the power to mediate vagus inhibition, which Howell fixed upon potassium, is a unique property of that element and not shared by magnesium.

On the Extracellular and Intracellular Venom Activators, with Special Reference to Lecithin, Fatty Acids and their Compounds: HIDEYO NOGUCHI.

Calcium chloride stops venom hemolysis caused in the presence of oleic acid or soluble oleate soaps, but not that induced by lecithin. In the majority of serums, including those of man, horse, guinea-pig, rabbit, cat, rat, hen, pigeon and goose, there exist greater or less amounts of venom activators, and they can be completely inactivated by calcium chloride. Judging from the fact that lecithin in an available form is not affected by this salt, it is not likely that these serums owe their venom activating property to lecithin. As these activators are also extractable with ether they probably are nothing else than certain fatty acids, and, probably, soluble soaps. Dog's serum offers an exception to this, and contains, besides fatty acids and soaps, also activators of the nature of lecithin, for calcium chloride fails to stop completely its venom activating property. This lecithin-like activator is not extractable with ether, but is precipitable together with the serumglobulin by half saturation with ammonium sulphate. While the serum globulin falls out as a precipitate during dialysis, this activator remains in the solution, from which a large percentage of lecithin is extractable with warm alcohol. In many respects this appears to be a protein compound of lecithin and possibly is identical with Chabrie's albumin, which seems to be absent from the majority of normal serums, which develops in any serum heated to coagulation, and which renders all serums equally venom activating. Ovovitellin is another form of protein compound containing lecithin in available form

for venom. On the other hand, pure serum globulins or serum albumins are not venom activating, notwithstanding their content of alcohol-extractable lecithin. Non-activating serum can be made activating by adding small quantities of oleic acid or oleate soaps.

The degrees of susceptibility of corpuscles are parallel to the amounts of fatty acids which they contain. The absence of fatty acids is associated with total insusceptibility of the corpuscles to the hemolytic agent of venom. The amounts of lecithin extractable from corpuscles are about the same in different bloods and bear absolutely no relation to susceptibility. The addition of adequate amounts of calcium chloride stops venom hemolysis with washed corpuscles of susceptible species. A previous addition of a small amount of lecithin annuls protection by this salt. A small amount of oleic acid or soluble oleate soap, which is insufficient to produce hemolysis alone, can render the corpuscles of insusceptible species hemolyzable by venom. An oily substance can be extracted with ether from the stoma of susceptible corpuscles, but not from the insusceptible varieties. This oily mass is venom-activating, but contains no lecithin.

On the Influence of the Reaction, and of Desiccation, upon Opsonins: Hideyo Noguchi.

The author found that opsonins were most active in neutral liquids. An alkalinity exceeding *n*/20 KOH prevented opsonization. An acidity of *n*/30 HCl was sufficient to stop the opsonic function of serum. Neutralization of excessive alkalinity or acidity caused reappearance of opsonic activity. On the other hand, an alkalinity or an acidity approaching that of the normal alkali or acid produced a condition of irreversibility of the inactivation. The opsonic index, estimated in the normal alkaline reacting serum, was far lower than that in a neutral medium.

The high stability of opsonins against desiccation and the high thermostability of dried opsonins are very striking. Almost no reduction of opsonic strength is evidenced after a serum is completely dried at 23° C. within a few hours. In the dry state, opsonins are well preserved even after two years. Temperatures below 150° C. do not destroy opsonins in the dry state. After heating at 150° C., dry serum becomes difficult to dissolve, but opsonins may still be detected in it.

Complements withstand desiccation and dry heat in a manner similar to the resistance of opsonins.

On Decomposition of Uric Acid by Animal Tissues: P. A. Levene and W. A. Beatty.

In these experiments uric acid was subjected to the action of spleen pulp in the presence of 2-per-cent. of ammonium hydroxide and 2 per cent. of acetic acid. Under both conditions 50 per cent. of the uric acid present was decomposed. Allantoin was one of the decomposition products.

On the Diuretic Action of Thymin: P. A. Levene.

The experiments were carried out on a dog with an Eck fistula. The dog had been kept on a purin free diet many weeks before the experiment was begun. For three weeks preceding the experiment the water consumed by the dog and the urine eliminated were carefully measured. It was noted that administration of thymin was followed by marked diuresis.

On Lysinglycyl obtained in the Tryptic Digestion of Egg Alumen: P. A. Levene and W. A. Beatty.

In the process devised by the writers a year ago for preparing the peptid, prolinglycyl, a substance was produced from egg albumen, which, on further cleavage, yielded only lysin and glycocoll. The substance could not be crystallized. The authors called attention to the fact that peptids of the hexon bases obtained by Fischer and Suzuki synthetically also failed to crystallize.

William J. Gies,
Secretary