takes place in the cell, we have an explanation of the fact, observed by Hedin, that different albuminous bodies yield on hydrolysis different amounts of arginin."

The fact that we have finally procured in protamin a chemically pure substance of a comparatively simple nature, which is, in all probability, the fundamental radicle of albumen, is of the very greatest importance in the study of the composition of the albumens, and may, perhaps, lead ultimately to their artificial formation.

In a third paper, 'On the Formation of Thymin from the Fish-sperm,' Kossel shows thymin to be a decomposition product of the nucleic acid of the sturgeon sperm, just as it is derived from the nucleic acid isolated from the thymus gland. He establishes its identity, also, with the body called 'nucleosin,' isolated by Schmiedeberg from the salmon sperm nucleic acid. From this there can be little doubt that these three acids are very closely similar in structure.

It has recently been found by the reviewer, in Kossel's laboratory, that the sperm of the sea urchin, *Arbacia*, also consists largely of protamin and nucleic acid.

It seems probable, from these results, that the head of the spermatozoon generally is composed of two very interesting substances, of nucleic acid, the essential chromatic constituent probably of all chromatins thus far isolated, free or combined, from yeast, pancreas and thymus gland; and of protamin, the radicle of albumen. The sperm seems to have rid itself of all superfluities and taken the essentials in their most compact form.

From Miescher's work we also have a good idea of the chemical nature of the sperm tail, although it is probable that the lecithin isolated therefrom is in reality combined in life with the albumen. As to the chemical nature of the middle piece little or nothing is so far known, but it is possible that, if the methods of histochemical isolation used by Miescher shall be found generally applicable, something may in time be learned of this.

We are still uncertain whether the protamin nucleate is identical in composition with the chromatin in the head of the living sperm, or whether in the process of isolation it has in some way changed, but the latter may not improbably be the case. At any rate it cannot be long until we have a general comparative chemistry of the chromatins, just as we have at present of the nucleins. The work of Kossel and Lilienfeld upon the chromatin of the calf's thymus, that of Kossel and Altmann upon the chromatin of yeast, of Hammarsten upon the pancreas chromatin, of Kossel upon the chromatin of the sturgeon's sperm and salmon, and that of Miescher upon the salmon sperm form the first stones of the foundation.

Albert Mathews.

SCIENTIFIC JOURNALS.

THE PHYSICAL REVIEW, VOL. IV., NO. 3, NOVEMBER–DECEMBER, 1896.

Experimental Determination of the Temperature in Geissler tubes: By R. W. Wood. It has been admitted for some time past that the light effects in Geissler tubes cannot be interpreted as indicating a high temperature. The phenomenon is unquestionably one of luminescence. Several writers, among whom Warburg may be especially mentioned, have discussed the theory of the phenomenon, and have arrived at results indicating that the temperature in an active Geissler tube is not greatly above the temperature of the surrounding air.

Mr. Wood has undertaken the difficult problem of actually measuring the temperature in the interior of a Geissler tube, making use of a fine wire bolometer so arranged that it could be moved from point to point through the tube. His results are, in the main, in agreement with the predictions of Prof. Warburg. The temperature in no case exceeds that of the surrounding air by more than 20 or 30 degrees. The temperature, however, is not found to be constant throughout the tube, but varies in accordance with definite laws throughout the space separating the two electrodes. The most striking results obtained by Mr. Wood apply to the case of a stratified discharge. In the curves which he presents to show the variation in temperature from point to point, a well defined ripple is seen corresponding to each layer or stratification. In passing from a bright layer

to the adjacent dark space a sudden temperature change amounting to four or five degrees was observed in almost all cases.

It can hardly be doubted that Mr. Wood's results will prove of great assistance in the development of the theory and explanation of Geissler discharge phenomena.

The Specific Heats of the Metals: By F. A. WATERMAN. Dr. Waterman's article contains, first, a critical discussion of the methods heretofore used in the determination of specific heat, which is accompanied by a table giving the values obtained by various experimenters. This table appears to have been prepared with much care and will be found extremely useful. The paper also contains the description of a new form of calorimeter devised by Dr. Waterman and used by him in determining the specific heats of bismuth, tin, aluminum, copper, gold and zinc. A description of the apparatus is beyond the limits of this abstract, but the instrument seems to be capable of a high degree of accuracy, and the results are thoroughly concordant.

Dr. Waterman has used especial care in obtaining pure specimens of the metals studied, and in this way avoids what is perhaps the commonest source of error in previous determinations.

The Viscosity of Mercury Vapor: By. A. A. NOYES and H. M. GOODWIN. Determinations of the viscosity of mercury vapor, hydrogen and carbon dioxide were undertaken by the writers, with the object of finding whether the viscosity of a gas can be made to furnish a criterion for distinguishing between monatomic and polyatomic molecules. As the authors very justly state, the recent discussions in connection with the atomic weight of argon have thrown some discredit on the indications of the specific heat ratio in this connection.

The kinetic gas theory shows that a simple relation exists between the viscosity of a gas and the cross section of the gaseous molecule. If the space occupied by a molecule is widely different from that occupied by an atom, we should therefore expect the viscosity of a monatomic gas such as Hg to differ widely from that of a diatomic gas like H. Such differences were however not found. Messrs. Noyes and Goodwin conclude that the space occupied by a molecule is of the same order of magnitude as that occupied by an atom, and that the viscosity can therefore not be used to determine the molecular complexity.

An Example in Thermometry: By A. S. COLE and E. L. DURGAN. The piece of work described in this paper was undertaken at the suggestion of Prof. Wm. A. Rogers, and has to do with the calibration of a mercury thermometer. The object of the paper is to give a description of the methods used in such calibrations, with sufficient detail to enable one to become thoroughly familiar with the process. The thermometer studied was one of those employed by Profs. Morley and Rogers in their work on the coefficient of expansion of Jessop's steel.

A Study of the Apparent Capacity of Condensers for Short-charge Periods: By H. V. CARPENTER. The 'soaking in' of a charge in a condenser is a phenomenon whose existence has long been known, and for which various explanations have been suggested. As is well known, the phenomenon leads to troublesome complications when it is desired to measure the capacity of a condenser, for the amount of charge taken up by a condenser will depend upon the duration of charging. Mr. Carpenter has undertaken to determine experimentally the variation in the apparent capacity due to this cause, as the period of charge is increased from a few thousandths of a second up to about half a second. Data are given for a mica condenser, a condenser made of paraffined paper, and one furnished by the Stanley Electric Manufacturing Company. The charging circuit was made as nearly as possible non-inductive, so that the effect studied could be separated from the similar effect which might be produced by self-induction. Results are shown in form of curves giving the variation in the charge as a function of the time of charge. Observations were made at various voltages. It appears that the rapidity of absorption varies greatly with different condensers. It seems also to depend somewhat upon the potential to which the condenser is charged. The rate of absorption is found not to be proportianal to the potential difference. Mr. Carpenter's curves indicate great uniformity in the behavior of a given condenser, and while

the laws of the phenomenon cannot yet be derived they at least appear to be definite.

Note on the Osmotic Theory of the Voltaic Cell: By H. M. Goodwin. Prof. Goodwin dissents in this article from some conclusions reached by Prof. Bancroft in a recent paper on 'The Chemical Potential of the Metals,' and presents results of recent determinations of the E. M. F. of certain types of cells in support of his position.

The Division of an Alternating Current in Parallel Circuits with Mutual Induction: By Frederick Bedell. This paper is devoted to a discussion, both graphical and analytical, of the case of branch circuits which act inductively upon one another. The general formulæ are derived and several special cases are considered. The results are not of a character which could be presented here to advantage.

On the Specific Gravity and Electrical Conductivity of the Normal Solutions of Sodium and Potassium Hydroxides, and Hydrochloric, Sulphuric Nitric and Oxalic Acids: By E. H. Loomis. The results of careful determinations of the specific gravity and conductivity are here presented in the case of some salts and acids for which these quantities had not previously been accurately determined.

New Books.—Wuller: Experimentalphysik. Carhart and Patterson: Electrical Measurements. Le Blanc: Electrochemie. Fleming: Alternate current transformer. Bedell: Principles of the Transformer.

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES.

The Section of Geology and Mineralogy, held its regular monthly meeting November 16th, with Prof. Albert H. Chester in the chair, as chairman *pro tem.*

The first paper was by Dr. E. O. Hovey, entitled 'On a Deep Well-boring at Key West, Fla.' Dr. Hovey described the geological section uncovered by the well for a depth of more than 2000 feet. A number of microscopic organisms were obtained. It proved somewhat difficult to identify the geological horizons, but without much doubt the well penetrated a considerable distance into Miocene. In the limestone many grains of quartz, possibly of secondary depositions, were met, and also rolled grains of quartz, doubtless in the nature of sand. Dr. Hovey commented on the significance of the phenomena, and expressed his obligations to Prof. Alexander Agassiz, from whom the samples had been obtained. The paper will appear in full in an early number of the Bulletin of the American Museum of Natural History.

Prof. A. J. Moses then exhibited a number of new mineralogical instruments which had recently been sent from Europe. They included a little adjustable dark room which could be fitted to a Fuess No. 2 Goniometer, so that crystals could be measured by daylight. Perfect signals could be obtained even in a well-lighted room. The instrument is called the Traube Verdunklungsvorrichtung. The universal rotation attachment for mineralogical microscopes which has been invented by Prof. Klein, of Berlin, for measuring the angle of the optic axes of microscopic crystals was also shown. Klein's new rotation apparatus for the orientation of thin sections was next described. The new attachment which can be adjusted to the Fuess Goniometer No. 2 for measuring the optic axes was shown and an opportunity was afforded to test it by actual experiment. The von Federow mica wedge (Glimmerkeil), which consists of a series of superposed $\frac{1}{4}$-undulation mica plates in step-like arrangement and is used for all the purposes of a quartz wedge, concluded the paper.

The third paper was read by Mr. A. Chester Beatty, and was entitled 'The Minerals of the Elkhorn Mine, Montana.' Mr. Beatty exhibited with comments, a remarkable series of calamine, smithsonite, native silver and other minerals.

Prof. A. H. Chester presented a paper on the new discovery of the brassy, micaceous mineral which seems, from the only analysis, to be chalcodite, and which has been found in a quarry at Rocky Hill, New Jersey. He also exhibited a remarkable series of rutile from Graves Mountain, Georgia.

G. F. Kunz described a new meteorite from Guatemala, and read a joint paper by Dr. Hillebrand and himself upon a new discovery of prosopite in Utah. He read also a joint paper by J. H. Pratt and himself on the new find of saphires at Utica, Mont.