clearer insight into the causal relations of things about him.

The thought element is ever dominant. He goes from strength to strength until no task seems too difficult for his disciplined powers.

Two young men stand before an intricate machine. They are told that their success in life depends in large measure on their ability to understand and use it. One examines piece by piece the parts of which it is composed. He discovers the way in which these parts are connected, the material of which they are made, their size, their strength, their beauty. After long and arduous study, he knows very much about the machine but he can not put it in motion, he can not make it work, he can do nothing with it except to admire its perfection of form.

The other student begins to construct another machine like the one shown him. As it grows under his hands, he is constantly using it for every operation to which it can be applied. As it approaches completion he admires more and more its adaptability and wide range of useful applications. Its beauty no longer affects him greatly, but he is lost in wonder and admiration before its marvelous power. This power he harnesses to the car of progress and he himself becomes one of the benefactors of his race.

Do we need to stop long to discover who is the 'man thinking'?

In later years mathematical instruction in this country has greatly improved in its thought content, but it has responded slowly and conservatively to modern methods. We are still more English than German. In the work of training a master of the physical sciences the text-book and the senseless repetition of words and formulas falling upon the dull ear of an instructor half asleep have been replaced by the lecture, the laboratory and the seminarium. Why should not mathematics, so intimately related to them, follow their lead and partake in the benefits of modern methods carried to their legitimate and logical completion?

C. A. Waldo.

Purdue University.

THE AMERICAN PHYSICAL SOCIETY.

The winter meeting of the American Physical Society was held in cooperation with Section B of the American Association for the Advancement of Science at St. Louis, joint sessions being held on December 29–31, 1903. The business meeting of the Physical Society was held on December 30, and the program for that day consisted of Physical Society papers.

The meeting was a distinctly successful one. The program, consisting of twelve papers, was as large as could be satisfactorily handled, and contained several papers of exceptional interest. While comparatively few eastern members were present, the attendance was, nevertheless, well up to the average of previous 'annual' meetings. The large attendance of physicists from the middle west, most of whom are only rarely able to attend the meetings in New York, offered a strong argument in favor of more frequent meetings in that part of the country.

At the annual election the officers of the past year were reelected, *i. e.*,

President—A. G. Webster.
Vice-President—Elihu Thomson.
Secretary—Ernest Merritt.
Treasurer—William Hallock.
Members of the Council—Messrs. E. Rutherford and W. S. Franklin.

It was decided to hold the spring meeting of the society (1904) in Washington, this action being taken in consequence of a cordial invitation extended to the society by the Philosophical Society of that city. Not only is the local membership of the society in Washington large, but the ad-

vantages of the capital as a place of meeting are exceptional, as was evidenced by the very enjoyable meeting there last winter. It seems, therefore, that a successful meeting may be confidently expected.

The Physical Society also voted to accept an invitation from the International Electrical Congress to hold a meeting in St. Louis during September, 1904, in connection with the meetings of the congress.

It was the sense of the council that a definite plan should be presented by the council at this meeting looking to the establishment of a western section of the society.

The papers presented were as follows:

The Radioactivity of Ordinary Metals: E. F. BURTON.

The conducting power acquired by gases when confined in a closed metal vessel has been explained as the result of two causes: (1) The radioactivity of the metal walls; (2) a penetrating radiation from without, which reaches the confined gas by first passing through the walls of the vessel. Mr. Burton has attempted to eliminate the latter rays by surrounding the vessel with a screen of water. A decrease in the conducting power of the confined gas was in fact produced, the decrease being approximately proportional to the thickness of water, and amounting to 32 per cent. when the water was 60 cm. thick. While the vessel was surrounded by a water screen of this thickness its conducting power was tested for different pressures, ranging from 19 mm. to 752 mm. The conductivity was found to be almost exactly proportional to the pressure. The author concludes that the conductivity is due to a penetrating type of radiation.

Does the Radioactivity of Radium depend on the Concentration? E. RUTHERFORD.

The intensity of the γ-rays from radium bromide was determined by the electrical method, first when the salt was in the solid form, and second when dissolved in a solution of radium chloride. The volume occupied in the second test was more than a thousand times as great as that in the first. No difference in the intensity of the γ-rays could be detected. Since the intensity of these rays serves as a comparative measure of the activity, the conclusion is reached that the activity of radium is independent of the concentration in the range covered by these experiments.

The Heating Effect of the Radium Emanations: E. RUTHERFORD and H. T. BARNES.

The authors described the results of further experiments on this subject. (For the preliminary experiments see *Nature,* October 29, 1903.) The evolution of heat by the emanation and by the deemanated radium was followed from the time of separation throughout the radioactive life of the emanation. The variation of the heating effects with time was found to be the same as the variation in radioactivity, *as measured by the α-rays.* Estimating the volume of the emanation released by heating one gram of radium as between 6×10^{-4} c.c. and 6×10^{-5} c.c., and assuming its density to be about 100 times that of hydrogen, the authors compute that 1 gram of the emanation would radiate during its life an amount of energy lying between 2×10^{9} and 2×10^{16} gram calories. A pound of the emanation would radiate energy initially at the rate of about 100,000 horse power.

The Phosphorescence of Organic Substances at Low Temperatures: E. L. NICHOLS and E. MERRITT.

About 120 substances, chiefly organic compounds of definite composition, were tested for phosphorescence and fluorescence at the temperature of liquid air. Of these only 21 failed to show luminescence at this temperature, while in numerous instances

the phenomena were quite brilliant. Except the phosphorescent sulphides no substances were found whose phosphorescence was *diminished* by cold. Perhaps the most interesting substance tested was tetrachlorphthalic acid. This showed both phosphorescence and fluorescence at —186° C., while quite inactive at ordinary temperatures. It was also stimulated by Roentgen rays, fluorescing under their influence as brilliantly as a good X-ray screen.

The Spectro-photometric Study of Fluorescence: E. L. Nichols and E. Merritt.

The authors investigated the spectrum of the fluorescent light from fluorescein and other substances when excited by light of widely different wave-lengths. The spectrum was found to be the same in all cases, even when the wave-length of the exciting light was greater than that of the brightest region in the fluorescent spectrum. In agreement with Lommel, and in opposition to Lamansky, Becquerel and others, two conclusions are reached, viz., (1) the distribution in the fluorescent spectrum is independent of the exciting light; (2) for substances of this class Stokes's law does not apply.

The Electrical Conductivity of Liquid Films: L. J. Briggs and J. W. McLane.

The thickness of films of Plateau's solution was computed from the area and weight, and the resistance of the films was directly measured. It was found by this method that the specific conductivity of films about 1 μ thick is less than one third that of the solution in mass.

On the Use of Nickel in the Marconi Magnetic Detector: A. L. Foley.

A detector with a core of nickel wires was found to have about the same sensitiveness as one using iron. The greatest sensitiveness was obtained by using a core containing both nickel and iron wires.

On Double Refraction in Matter moving through the Ether: D. B. Brace.

Electric Double Refraction in Gases: D. B. Brace.

The author presented a brief preliminary account of work on the subjects mentioned in the two titles above, but looked upon the experiments as not yet carried far enough to make a detailed report desirable.

The Work of the National Bureau of Standards: E. B. Rosa.

The Spectrum of the Afterglow of the Spark Discharge in Nitrogen at Low Pressures: Percival Lewis.

The phosphorescence studied is produced only in the purest obtainable nitrogen. Instead of a continuous spectrum, which is observed in most cases of afterglow, the light in this case gave a banded or line spectrum. The spectrum contains a number of unidentified lines, of which four in the visible region are especially prominent. Certain of the lines of nitrogen, mercury and aluminium (the last due to the electrodes) were also present.

J. J. Thomson has advanced the hypothesis that afterglow effects are due either to chemical actions in a mixture or to polymeric changes in a pure gas. If this be the explanation—and it seems a reasonable one—how can a chemically neutral gas excite luminosity in every metallic vapor which may be present, such as mercury and aluminium?

The Spectrum of the Electrodeless Discharge in Nitrogen: Percival Lewis.

The discharge was obtained in the form of a ring by the use of an oscillatory discharge in a coil surrounding the tube. Any effects due to electrostatic influences were eliminated by screens of moistened pasteboard. The spectrum showed the bands of the second and third groups, as classified

by Deslandres in the case of the positive column of the ordinary discharge with electrodes. The first group was entirely absent. It was interesting to find that some of the characteristic bands of the negative glow were also observed.

ERNEST MERRITT,
Secretary.

SCIENTIFIC BOOKS.

A Monograph of the Culicidæ or Mosquitoes. By FRED. V. THEOBALD, M.A. Volume III. London, printed by order of the trustees of the British Museum. 1903. Pp. xvii + 359; 193 text figures; 17 plates.

Interest in matters connected with mosquitoes has been increasing so rapidly of late, and so many students and physicians in all parts of the world have been taking up the investigation of this family of dipterous insects, that Mr. Theobald's monograph of 1901, published in two volumes of text and one volume of plates, was hardly in the hands of investigators before almost enough material had accumulated for another volume. Between April, 1901, and February, 1903, over one hundred collections were received at the British Museum, and the present volume includes consideration of this material. In the volume are described 23 new genera, 88 new species and 8 new varieties. At this point Volume III. stops. Since that time already 25 new collections have been received at the British Museum, and whatever new forms are contained in these and subsequent collections will be described in journals, and it is not proposed to issue another volume until the arrival of new species slackens and the subject has reached a more final stage. This means that for some time to come people wishing to identify mosquitoes must base their work primarily upon the three volumes published and afterwards consult all sorts of scientific periodicals, both biological and medical, for descriptions of new forms, which will necessitate some rather extensive card-cataloguing. In the meantime it may parenthetically be stated that no doubt Mr. Theobald will be glad to name specimens for persons sending them to him, and the writer holds the services of his force at Washington at the disposal of inquiring medical men and other culicidologists.

In Volume III. the British Museum authorities have abandoned the colored plates which formed so attractive and excellent a feature of Volumes I. and II., but the text contains many figures giving anatomical details of the new species, including a number of figures of various stages. The plates are all done by the collotype process from photographs, and are in the main very good. Careful drawings would have been much better than some of them, especially the heads on Plate IX. and the larva and pupa on Plate XVI.

In the preparation of this volume Mr. Theobald has shown great care and very good judgment. He has been most industrious in bringing together many points concerning the biology of different species in spite of the fact that his main interest seems to have been in the classification of the adults, and as a matter of course the volume is a mine of information concerning the geographic distribution of species. He had before him practically no additional material from North America in the preparation of Volume III., although he introduces some Central American forms, some from the West Indies and a number from South America. The bulk of his additional material, however, has come to him from Africa, India and Australasian regions.

One point which he brings out which will be of interest to North American students is his decision that *Anopheles walkeri,* which he described from specimens (number not given) collected at Lake Simcoe, Ontario, in September by E. M. Walker, is really a synonym of *Anopheles bifurcatus* Linnæus of Europe, a species of rather wide European distribution, occurring from Lapland to Italy and the Mediterranean islands.

Since the publication of Volumes I. and II. an important attempt has been made by M. Neveu-Lemaire to formulate a classification of mosquitoes mainly on palpal and venational characters. Mr. Theobald shows that while the French author in his classification upholds certain genera proposed by Theobald