guidance into the micropyle to such stimulus. Dr. MacDougal remarked upon recent conclusions that pollen tubes show negative reactions to oxygen, but positive to sugars, and to albuminoid substances in the ovary or near the embryo-sac.

EDWARD S. BURGESS,
Secretary.

THE NEW YORK SECTION OF THE AMERICAN CHEMICAL SOCIETY.

THE February meeting of the New York Section of the American Chemical Society was held at the Chemist's Club, 108 West 55th street, on Friday evening, the 9th inst., Dr. C. F. McKenna presiding. After consideration of a series of resolutions submitted by the Committee on Standards for Instruments of Measure, the following papers were read: 'The Technical Analysis of Rope and Twine,' by Durand Woodman; 'A New Synthesis in the Phen-Miazin Series,' by Marston Taylor Bogert; 'On the History of Photo-Chemical Improvements,' by Maximilian Toch.

Dr. Woodman described the chief commercial grades of Cordage, 'oiled' and 'unoiled,' 'tarred,' 'plumbagoed,' etc., and exhibited samples of manila, sisal and jute fiber with analyses; also analyses of the different grades of rope above mentioned.

Dr. Bogert described a new method of preparing the salts of the Phen-miazin series as developed in the organic laboratories of Columbia University, which consists in heating anthranilic acid with any nitrile in a sealed tube for several hours at a temperature of 200 degrees to 250 degrees C., according to the nitrile used. Since many foreign chemists, as well as several in this country, are working on this same subject, it is very gratifying to have a successful result on a new line of experiment from the University in this city.

Mr. Maximilian Toch described chiefly the progress in photo-chemistry, and illustrated the method of printing and developing some of the more rapid bromide papers. His paper was listened to with great attention and was followed by remarks and reminiscences from several members

DURAND WOODMAN,
Secretary.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

AT the meeting of the Academy of Science of St. Louis of February 5, 1900, some 250 persons were given a demonstration of the use of the microscope in the sciences, arts and industries, by experts, under the direction of Dr. H. M. Whelpley, as follows:

Anatomy, Dr. R. J. Terry; *Bacteriology*, Dr. Amand Ravold; *Blood examination*, Dr. Ludwig Bremer; *Botany*, Mr. H. F. Roberts; *Diseases of forest trees*, Dr. H. von Schrenk; *Drug adulterations*, Mr. O. H. Elbrecht; *Flour inspection*, Mr. Victor Goetz; *Insects parasitic on man*, Mr. C. F. Baker, *Living protoplasm*, Dr. Otto A. Wall, Jr.; *Microphotography*, Mr. Robert Benecke; *Mineralogy*, Dr. G. Hambach; *Photographic dry plate testing*, Mr. Robert Benecke; *Photomicography*, Dr. Adolph Alt; *Physiology*, Dr. Hartwell N. Lyon; *Seed adulterations*, Mr. F. W. Maas; *Spice adulterations*, Mr. William K. Ilhart; *Textile fibers*, Mr. Peter J. Weber, Jr.; *Trichina*, Dr. G. C. Crandall.

Through the courtesy of the Historical Society, the rooms of that Society were thrown open to the members of the Academy and their guests, and the Society's important collections, as well as the demonstration offered by the Academy, proved a source of interest and instruction to the ladies and gentlemen present.

WILLIAM TRELEASE,
Recording Secretary.

NOTES ON PHYSICS.

DRUDE'S ANNALEN.

A NEW series (the fourth series) of the *Annalen der Physik*, begins with the current number, January, 1900, under the editorship of Paul Drude. This great periodical will now be known as *Drude's Annalen*. The third series, the *Annalen der Physik und Chemie*, edited by G. and E. Wiedemann, contains sixty-nine volumes. The entire series, 305 volumes to date, represents a large part of the progress of the physical sciences during the eighteenth and nineteenth centuries.

RADIANT HEAT.

PROFESSOR MAX PLANCK gives, in *Drude's Annalen*, January, 1900, a reprint of his electro-magnetic theory of radiation which was com-

municated to the Berlin Academy of Sciences in May, 1899. This memoir, which seems to be monumental in character, is remarkable in that it verifies the Stefan-Boltzmann law, derived from thermodynamic considerations, that the total energy radiant from a black body is proportional to the fourth power of the absolute temperature, and the law of W. Wien concerning the distribution of energy in the spectrum of a black body.

Wien's conclusions are based upon certain assumptions as to the number of radiant centers (molecules) in unit volume and their velocity. It is now known that the total energy radiated from a black body and its distribution in the spectrum depend only upon temperature and are entirely independent of the physical properties of particular substances, so that it is highly probable that the law of total energy and the law of its distribution in the spectrum are capable of rigorous derivation from assumptions of axiomatic simplicity.

The theoretical results of Stefan, Boltzmann and Wien, now verified by Planck, may, therefore, eventually appear to be independent of the highly specialized character of the assumptions upon which they are based. When this stage of the science is reached, these laws of radiation will no longer appeal to experiment for verification, but they will take their place among numerous other established laws as instruments for the interpretation of experimental results.

Physicists ought to drop the term radiant energy and retain the older and better term radiant heat, inasmuch as the energy of radiation is heat in the same sense that molecular energy is heat. Both types of energy are subject to the first and second laws of thermodynamics; both types give rise to the entropy function, and Maxwell's law of molecular velocity distribution is strictly analogous to Wien's law of the distribution of energy in the spectrum.

THERMAL CONDUCTIVITY.

HEAT measurements are among the most inaccurate of physical measurements and the measurement of thermal conductivity is perhaps the most inaccurate of the measurements in heat. Professor Kohlrausch (*Drude's Annalen*, January, 1900) proposes a method for measuring thermal conductivity which depends upon the final permanent distribution of temperature in a conductor carrying electric current, heat being allowed to flow out of the conductor only at the points where current enters and leaves it. Under these conditions a remarkably simple relation subsists between the temperature at a point, the electric potential at a point, and the ratio of electrical to thermal conductivity. The method depends only upon measurements of temperature, of electrical potential, and of electrical conductivity. W. S. F.

ENGINEERING NOTES.

A NUMBER of European nations are now adopting the Gruson chilled iron shield for their land defences and the success of the invention is so well-assured, it is said, that the Messrs. Krupp, some time since, bought the *Grusonwerke* and have developed the invention to a state of considerable perfection. The Gruson armor-turrets are thought to be practically invulnerable; their flatly curved tops deflecting shot and shell and their adamantine chilled surfaces and their great thickness making them impenetrable to direct impact of the heaviest shot. It is proposed to endeavor to introduce this device into the United States, where it is thought that it may be made even more successful, since our chilling irons are found to be superior to those of any other country. The turrets are usually of from 50 to 100 tons weight and are built up of great staves and segments, ten or fifteen of which constitute the low, wide, circular, covered box which constitutes the turret and protects the guns. The top is usually made of two semi-circular halves. In their manufacture, the quality of iron employed is presumably that found to make the best car wheels and one of peculiar strength and toughness, as well as of intensely hard chilling property. A *Grusonwork* is to be established at Chester, Pa., by New York and Philadelphia capitalists.

THE success of the submarine craft which have been recently produced in the United States and in France is stimulating other nations, and an authority among English technical journals—*Industries and Iron*—says: "In spite of the derision with which they have been