

methods, and the day is far distant, if it ever comes, when cellular physiology shall be nothing but applied physics and chemistry. We can not foresee a time when purely observational and descriptive biological studies, which to-day hold the first place, shall not continue to have their value. They represent the direction which makes the strongest appeal to the great majority of naturalists. The broadest generalizations hitherto attained in biology, the doctrine of the cell as the vital unit and the theory of organic evolution, have come from this biological, as distinguished from physical, direction of investigating living organisms, and were reached by men with the type of mind of the pure naturalist, who loves the study of forms, colors, habits, adaptations, inheritances of living beings.

It is well that the sciences of nature hold out attractions to so many different types of mind, for the edifice of science is built of material which must be drawn from many sources. A quarry opened in the interest of one enriches all of these sciences. The deeper we can lay the foundations and penetrate into the nature of things, the closer are the workers drawn together, the clearer becomes their community of purpose, and the more significant to the welfare of mankind the up-building of natural knowledge.

WILLIAM H. WELCH

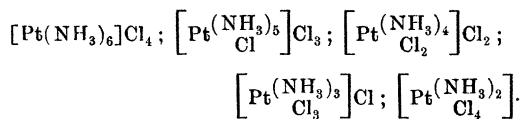
THE JOHNS HOPKINS UNIVERSITY

SCIENTIFIC BOOKS

Neure Anschauungen auf dem Gebiete der Anorganischen Chemie. By ADOLPH WERNER. Braunschweig, Vieweg und Sohn. 1905. Pp. xii + 189. Price 6 marks.

The book before us presents a system for classifying inorganic compounds in such a way that "complex salts," "molecular compounds," hydrates, etc., as well as simple substances, may be included. The fundamental idea which underlies Werner's scheme is a new conception of valence. It is a well-established

fact that in many cases compounds in which all of the valences of the individual atoms seem to be fully saturated, still possess the power of combining with other similarly saturated compounds to form complex salts. From this fact Werner draws the conclusion that we must drop our idea of independent, definitely directed valences. In place of this conception he introduces that of "affinity"—an attractive force acting, in the manner of an electrical charge on a sphere, from the center of the atom and uniformly distributed on its surface. Valence is then simply an empirical relation regarding the effect of this force on other atoms. Through considerations based on manifold experimental data he decides that this valence—the manifestation of "affinity"—must be of two kinds which he calls, respectively, *principal* and *subordinate* valence. The former produces the combinations of atoms met with in ordinary salts, giving rise to ionizable radicles; this property can be expressed in modern terms by saying that principal valences can bind atoms or molecules to electrons. Subordinate valences are also active in joining atoms to atoms, but in no case can they produce ionizable substances. Thus in the case of compounds between platinum, ammonia and chlorine we have the following series of compounds in which Cl outside of the brackets represents ionizable chlorine—primary valence—and that enclosed by the brackets non-ionizable chlorine—subordinate valence:



It will be seen that the total number of molecules bound directly to platinum is a constant—six—called by Werner the "coordination" number. He has found that for all of the elements forming "complex salts" this "coordination number" is either four or six.

That there is ground for Werner's dissatisfaction with the present conception of valence, no one can doubt, especially after reading the introductory chapters of this book. It is equally clear that in his new classification

Werner has given a sufficiently elastic idea of the action of atoms upon one another to account for many of the facts which at present are anomalies. The chapters on isomerism and stereoisomerism too are suggestive and a number of interesting new relations have been presented. It is unfortunate, however, that the direct evidence for his theory is given in this book in so unsatisfactory a manner. His use of physico-chemical arguments is frequently very careless, his proofs for the constitution of compounds are often unconvincing, and the great mass of material is presented in no very clear and orderly fashion. The result is that the reader, if not previously acquainted with Werner's ideas and work, finds that the book leaves merely a confused impression. For a clear, brief presentation of the subject the reviewer recommends the reading of a lecture delivered by Werner before the *Deutsche chemische Gesellschaft* (Ber., 40, 15). The book will then be valuable as an amplification of his paper.

HERMAN SCHLESINGER

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A Manual of Biological Projection and Anesthesia of Animals. By AARON HODGMAN COLE, A.M., Instructor in Biology and Projection in the Chicago Normal School. Chicago, Neeves Stationery Company. Pp. 200. \$1.50.

The author of this little volume is to be congratulated on having produced a very useful and timely manual on the technique of projection. The scope of the work will be seen from the following partial table of contents: outline of methods and comments of educators on results obtained; available lights and their limitations; solar projection apparatus and its management, methods of darkening rooms, different types of screens; artificial lights and their management; methods of anesthetizing typical animals and plants; how to collect a large variety of species of animals and plants suitable for micro-projection and keep them alive in aquaria; directions for making different types of glass cells in which live animals and plants are mounted for projection; the knack of mounting and

projecting various microscopical preparations, including live plants and animals; the projection of pictures and other opaque objects by the use of reflected light.

From the viewpoint of composition, with the possible exception of a few involved and somewhat obscure sentences, the book is clearly written and the subject-matter well arranged, although, in a few instances, there is a tendency toward what appears to be unnecessary repetition. However, the author doubtless feels—and justly so—that this may be forgiven in the interest of clearness. There seems to be no possible contingency in method or material that the author has not anticipated and given explicit directions for obviating, from which it is evident that the book is the outcome on his part of years of practical experience in projection work. The “ready reference table” (p. 180) for mounting and projecting a large number of objects, ranging from bacteria to living chick embryos, should prove of great convenience to the manipulator. The text is farther elucidated by the aid of twenty-eight figures and diagrammatic sketches.

In the words of the author, “every method described is the outgrowth of a need felt in teaching in some grade in grammar and high school, college and popular educational work, and each one has been tested in practise.” This statement in itself is indicative of the wide range of uses to which the projection microscope may be put to-day.

M. F. GUYER

SOCIETIES AND ACADEMIES

THE NEW YORK ACADEMY OF SCIENCES

The New York Academy of Sciences held its annual meeting on Monday evening, December 16, at the Hotel Endicott, about seventy members and their friends being in attendance.

The report of the corresponding secretary showed that during the last year the academy had lost, by death, one honorary member, Professor Asaph Hall, and three corresponding members, Professor George Chapman Caldwell, Professor W. H. Chandler and Dr. Charles B. Warring. The names of two