honor have not appeared to make rigid quotation essential.

Theo. B. Comstock
Los Angeles, Cal.,
January 15, 1909.

Ueber das Wesen der Mathematik. Rede gehalten am 11 Marz, 1908, in der öffentlichen Sitzung der k. Bayerischen Akademie der Wissenschaften. Von Dr. A. Voss, Professor der Mathematik in München. Pp. 98. Leipzig und Berlin, B. G. Teubner. 1908.

The numerous and valuable earlier publications of the author of the present address inspire confidence in his ability to treat such a general subject in a scholarly and helpful manner. The reader will find that this confidence has not been misplaced, for the address is not only replete with important suggestions in regard to fundamental questions in mathematics, but it also emphasizes those elements which point towards rapid progress in the near future and thus awaken a healthy optimism. It seems especially suited to widen the outlook and to arouse energizing enthusiasm on the part of the young mathematician who may fail to appreciate the dignity and the beauty of abstract thought.

The author begins his address by the statement that we are living in the epoch of natural sciences and technology, and he quotes approvingly the remarks of Galileo:

> True philosophy explains nature, but no one can understand her except those who have learnt the language and the symbols by means of which she speaks. This language is mathematics and the symbols are mathematical figures.

The bearing of mathematics just mentioned tends to explain why this subject is constantly taking deeper root in the educational systems of the world, notwithstanding the fact that it is "the most unpopular of all the sciences; it is a part of the essence of a true science to be unpopular."

The brief introductory remarks are followed by a rapid sketch of some fundamental facts in the history of mathematics. Beginning with the Egyptian work, written by Ahmes nearly four thousand years ago, which claims to give "Directions to obtain a knowledge of all dark things, all secrets contained in the things," our author considers the historical development of a number of fundamental mathematical concepts and symbols. He generally follows the "Prince of mathematical historians," Moritz Cantor. In one instance, however, he adopts a view which is not in accord with the most recent work of Cantor, viz., as regards the question of the origin of zero and the positional arithmetic. Ten years ago it was generally believed that these discoveries were due to the Hindus, while the most recent work of Cantor makes a Babylonian origin appear much more plausible.

As may be inferred from the heading of the address, emphasis is placed upon those mathematical concepts which border on the domain of philosophy. Among the questions which receive considerable attention are the following: definitions of mathematics, relations between mathematic and logic, the development of the concept of number, higher complex number systems and different points of view as regards ordinary complex numbers, different theories in regard to ordinary fractions and irrational numbers, continuity and limit, importance of the concept of function, and suggestions as to changes in the subject-matter to be used for instruction in secondary schools. The address is written in a popular style and should interest the man of general culture as well as the professional mathematician.

G. A. Miller
University of Illinois

SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Experimental Zoology, Vol. VI., No. 1 (January, 1909), contains the following papers: "A Study of Growth in the Salamander, *Diemictylus viridescens,*" by Ada Springer. "Studies on Chromosomes—IV., The Accessory Chromosome in *Syromastes* and *Pyrrochoris,* with a Comparative Review of the Types of Sexual Differences of the Chromosomes," by Edmund B. Wilson. This paper is devoted to a reexamination of two forms heretofore studied by Gross. It shows that sex-production in these forms agrees in principle with that seen in other insects. In *Pyrrochoris* the spermatogonial number is 23

and a typical odd chromosome is present. In *Syromastes* the spermatogonial number is 22, the "accessory" being represented by two chromosomes, and the number 24 is inferred for the female. A general review is given of the facts thus far determined in this field. N. M. Stevens contributes "Further Studies on the Chromosomes of the Coleoptera" and "An Unpaired Heterochromosome in the Aphids." David Day Whitney writes on "The Effect of a Centrifugal Force upon the Development and Sex of Parthenogenetic Eggs of *Hydatina senta*." The unsegmented eggs were centrifuged so that their contents were separated into three layers. These layers were variously arranged in their relation to the first cleavage plane and consequently a different distribution of the egg material occurred in each of the cells at the first cleavage. From such eggs normal individuals developed, grew to maturity, and produced normal offspring. No change in the sex ratio occurred. The same author has an article on "Observations on the Maturation Stages of the Parthenogenetic and Sexual Eggs of *Hydatina senta*." In the female parthenogenetic egg there is no reduction in the number of chromosomes during maturation but in the male parthenogenetic egg and also in the fertilized egg there is a reduction in the number of chromosomes. One polar body is formed by the female parthenogenetic egg and two polar bodies are formed by the male parthenogenetic egg.

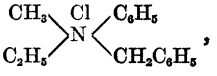
A NEW VARIETY OF ASYMMETRY EXHIBITED BY THE NITROGEN ATOM

A NUMBER of organic compounds are known the isomerism of which is due to the different spatial arrangement of certain groups around a nitrogen atom. The most familiar examples are the oxines, such as benzaldoxine, which exists in the forms,

$$\begin{matrix} C_6H_5CH \\ NOH \end{matrix} \quad \text{and} \quad \begin{matrix} C_6H_5CH, \\ HON \end{matrix}$$

termed the *syn-* and *anti-* modifications, respectively.

A second variety of isomerism is recognized which is dependent on the fact that the nitrogen atom is linked to five dissimilar groups, as, for example, in the compound,

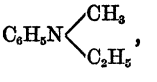


which exists in three forms. One is optically inactive (racemic) and the other two rotate the plane of polarized light to the right and left, respectively.

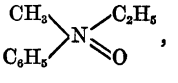
Similar varieties of isomerism are, of course, common in the case of analogous carbon compounds free from nitrogen.

Hitherto it has been believed that the difference in optical behavior mentioned above could not be exhibited unless all five of the groups linked to the nitrogen were unlike, but J. Meisenheimer[1] has just shown that this is not the case.

When methylethylaniline,

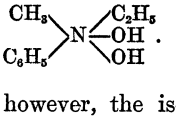


is treated with hydrogen peroxide, in presence of sulphuric acid, methylethylaniline oxide,



is formed. It is a crystalline, basic substance and is optically inactive. By the fractional crystallization of its *d*-bromcamphorsulphonic salt it is separated into two modifications. From these the corresponding free bases may be isolated and other salts prepared. These free bases are relatively stable and they rotate the polarized light to the right and left, respectively, the rotation being equal in degree.

It is, at present, uncertain whether these optically active free bases have the anhydro formula given above, with the double linkage between nitrogen and oxygen, or whether they are dihydroxides,



In either case, however, the isomerism is of an entirely new type. It will be interesting to see whether it is possible to prepare analo-

[1] *Ber. deut. Chem. Ges.*, 41, 3966, 1908.