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.

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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