unfertilized egg. Two clear cases of parthenogenesis among seed plants have been published, namely, that of *Antennaria*, by Juel, in 1898, and that of certain species of *Alchemilla*, by Murbeck, in 1901. Dr. J. B. Overton, in a thesis about to be published in the *Botanical Gazette*, announces the same phenomenon in *Thalictrum purpurascens*. In this last case the segmentation of fertilized and unfertilized eggs was compared. In the former case the segmentation occurs synchronously with that of the definitive nucleus, while the unfertilized egg delays division until the very numerous free endosperm nuclei are parietally placed. It is surrounded by a very dense mass of granular cytoplasm, and associated with its segmentation are striking changes in the zone of cytoplasm immediately in contact with the egg. Overton suggests the possibility of an enzyme being secreted by the egg, and a digestion of the cytoplasm. If this be the case, substances may well be developed in the changing cytoplasm that will bring about those physical changes in the egg that induce segmentation. Observations in other species were mentioned that indicate the possibility that parthenogenesis may be a much more common phenomenon among seed plants than has been supposed. The suggestion was also made that in any embryo sac rich in cytoplasm a parthenogenetic embryo may arise.

The chairman called attention to the model herbarium and the collection of economic plant products at the Field Columbian Museum, to which the visiting botanists would be admitted free on presentation of their registration cards. In conclusion he spoke of the interest in the meetings, as evidenced by the large number who attended all of the sessions, and of the fact that this third successful meeting of the Botanists of the Central States, a body without organization, showed that its success depended upon the spontaneous interest taken in botanical work.

ALBERT SCHNEIDER,
Secretary.

SCIENTIFIC BOOKS.

Towers and Tanks for Water Works. By J. N. HAZELHURST, Mem. Am. Soc. C. E. New York, John Wiley & Sons. 8vo. Pp. 216; 19 illustrations.

In this work the author has evidently aimed not only to discuss those features of structural design peculiar to stand-pipe and tank construction, but also to include sufficient information relating to some of the more general matters as to make the volume complete in itself. Out of the eleven chapters of the book he thus devotes two chapters to the consideration of the properties of iron and steel, two to elementary mechanics, one to the subject of foundations, and one to the painting of steel structures. The remaining five chapters deal more specifically with the design and construction of tanks, although they also contain much of a general and elementary character.

While the engineer will find such subjects as foundations, and iron and steel, much more fully treated in special works, it is certainly convenient to have in concise form such information on these subjects as will be of direct application to this particular field of design. The chapter on painting is valuable and quite in place here, owing to the great lack of information on this important subject. The subject of riveting is quite fully treated, and convenient tables are given for the use of the designer.

In the chapters treating of the principles of mechanics and their applications to the design of the structures under consideration there is much to be criticised. This portion of the book is in fact full of the grossest errors of theory, and were it not for the very absurdity of the mistakes it would be unfortunate for such a book to come into the hands of a young engineer. The treatment of tanks is also very incomplete, no consideration being given to six- or eight-post towers and practically none to the calculation and design of tank bottoms. We are warned, however, in the introduction not to expect 'elaborate calculations and deductions based upon problematical theories and conditions,' but only 'such facts as may have been verified, freed, as nearly as may be possible, from the tons of mathematical rubbish,' etc. The following are, presumably, some of the 'verified facts': On page 59 it is stated that 'the moment of forces about a point may hold each other and establish equilibrium of the body, even though the forces themselves fail to balance.' Also that 'the direction of the resultant of two forces is exerted in a line bisecting the original angle at which the forces met, and the extent of the force exerted by this resultant is the difference between that offered by the two or more original forces, or the moment of those forces.' Again, in Chapter VIII., in the analysis of the stresses in a four-post tower, scarcely any of the stresses have been correctly determined. The tower legs are straight and have an inclination of one in ten; the wind bracing is of the usual type, consisting of horizontal struts and diagonal tie rods. The method of calculating the compression in the struts is as follows: "The inclination of the column being one in ten, one-tenth of the load is transferred to the horizontal member as compression-stress, and the remaining nine-tenths is distributed at the base of the column to the foundation." The column stress being 133.9 tons, the thrust against the strut is therefore 13.39 tons; but, since the thrust from each of the two opposite columns is 13.39 tons, the strut must be designed to resist *twice that or 26.78 tons!* The stress in the strut 'in transferring the wind stress as tensile stress' is not considered, this member being designed only for the compression as above found, together with the stresses due to its own weight. In finding the wind stresses in the diagonals of the upper panel, the stress in each is taken at one-eighth of the total wind pressure on the tank, presumably because there are eight diagonals in the top story of the tower. In this way the stress is computed to be about eight tons, with an assumed wind pressure of seventy tons, whereas the correct stress is about thirty-two tons. Finally the wind stress in each column is taken as constant from top to bottom.

These and other illustrations which could be given suggest that it might have been better to admit some of the 'mathematical rubbish' so carefully excluded.

F. E. T.

Geometric Exercises in Paper Folding. By T. Sundara Row. Edited and revised by Professors W. W. Beman and D. E. Smith. Published by the Open Court Publishing Company, Chicago. 1901. Pp. x+148.

In the author's preface to this little work, dated from Madras, India, 1893, the double purpose is set forth 'not only to aid the teaching of geometry in schools and colleges but also to afford mathematical recreation to young and old, in an attractive and cheap form.' Without attempting to develop a geometry as rigidly confined to folding as the Euclidean is to compass-and-ruler work, it is shown how a large number of interesting metrical and positional relations can be illustrated without the use of instruments other than a penknife and scraps of paper, the latter for setting off equal lengths on folds. Sheets of paper adapted to the work accompany the book, and the allusions in the text to certain kindergarten 'gifts' imply the pupil's possession of an equipment of elementary geometric forms. The processes are based on the principle of congruence.

The first nine chapters are devoted to the regular polygons of Euclid's first four books, and to the nonagon. Beginning with the folding of the fundamental square, and progressing through equilateral and other triangles, the Pythagorean theorem and consequent propositions are reached, with certain puzzle squares based thereon. In Chapter X. progressions—arithmetic, geometric and harmonic—are neatly illustrated, as also the summation of certain series. This section is enlivened by the insertion of the legend regarding the duplication of the cube. It would have been an appropriate place to refer to the adaptation of the cissoid and conchoid of Chapter XIV. to the same problem.

In Chapter XI. the numerical value of π