Yet he asserts that in no American text-book 'has a thoroughly satisfactory treatment been given,' and says: "In my opinion, it is not possible to discuss, in an elementary manner, propositions relating to the magnitude of curved lines until after the introduction of Duhamel's well-known postulate. It may therefore be of psychologic as well as geometric interest to point out that I had lived through the mental state in which my honored friend, Prof. Fiske, now finds himself, and had already attained simpler and clearer light before 1893, when there appears in my paper 'The Old and the New Geometry' in the *Educational Review* the following:

"'That stale stupidity, 'A straight line is the shortest distance between two points,' is equally unavailable for foundation building.

"As Helmholtz says: 'The foundation of all proof, by Euclid's method, consists in establishing the congruence of lines, angles, plane figures, solids, etc.

"'To make the congruence evident the geometrical figures are supposed to be applied to one another, of course without changing their form and dimensions.'

"But since no part of a curve can be congruent to any piece of a straight line, so, for example, no part of a circle can be equivalent to any sect in accordance with the definition of equivalent magnitudes as those which can be cut into pieces congruent in pairs. Thus the whole of Euclid's *Elements* fails utterly to prove any relation as regards size between a sect and an arc joining the same two points. We cannot even affirm that any ratio exists between a circle and its diameter until after we have made extra-Euclidean and post-Euclidean assumptions at least equivalent to the following: 1. No arc is less than its chord. 2. No minor arc is greater than the sum of the tangents at its extremities."

May I be allowed to state that in the years that have followed my printing of this double postulate I have only been more confirmed in my opinion that it is more elementary and more elegant than the one for which I deliberately substituted it, and which Prof. Fiske has again given on p. 724 of Science. When Prof. Fiske applies these ideas to the geometry of Beman and Smith, I am very forcibly reminded that without the slightest word of acknowledgment these professors '*took*' a whole block of problems and a long note from Halsted's Elements of Geometry.

The section *Partition of a Perigon*, Elements p. 151, is so peculiarly my own that it was as startling as a ghost to meet it unexpectedly in Beman and Smith p. 179. Then follows my Problem I: To bisect a perigon, with my corollary; then follows as their Problem 2 my Problem II: To trisect a perigon, with my corollary. Then my Problem III: To cut a perigon into five equal parts, and my corollary. Then my Problem IV: To cut a perigon into fifteen equal parts, with my corollary. Then before they go on to my Problem V. and Problem VI. and Problem VII. and Problem VIII., they insert my long note, Elements p. 155; but here they out-Herod Herod, or rather out-Perigon Halsted, for where I say that Gauss, in 1796, found that a regular polygon of 17 sides was inscriptible, they make it say 'In 1796 Gauss found that a perigon could be divided into 17, etc.' But, of course, the whole of the *matter* here involved is so well known that I accept the implied compliment, *broad* as it is, and dream that even my rather cranky problem to bisect a perigon was not really as peculiar as I had thought it.

George Bruce Halsted.
Austin, Texas.

THE DATE OF PUBLICATION AGAIN.

Dr. J. A. Allen has not offered any serious objections, to my view of this matter in his remarks in Science of December 4th, as it seems to me, but he has in one instance misunderstood me, as I now explain. He quotes as follows my remark, that "although some reports issued by our government may bear dates much prior to the dates of issue, it does not follow that the date of printing bears any such relation to the date of issue." What I meant by this may be illustrated by a concrete case. The 'Report of the Commissioner of Education,' which I last received, bears on its back and title page the dates 1893–4. As it was not printed until 1896, I find the date 1896 at the foot of the title page. This will explain my meaning, which would seem to have been misunderstood by Dr. Allen. It also explains my remark

that 'the date given on the title page must be accepted as the date of publication.'

The fundamental point in this matter has really not been touched on by Dr. Allen or by myself. What we desire to ascertain is that date at which the discovery of a fact was announced, a formulation made, or a name given, and by whom. Until the description of the fact, the formulation, or the name, is printed, it has no fixity, and may be indefinitely altered. After it is printed the statement cannot be altered. Such a printed statement, wherever and whenever found, determines the question. Whether this be publication or not, the printed document will settle the question of priority, which is the point which we desire to have settled. It appears to me that no rules can set aside this proposition, however inconveniently it may sometimes, fortunately rarely, affect us. If we adopt (or rather follow, as it is already adopted) this view, we escape the complicated, and to my mind insoluble, questions as to publication, which may be brought up. It will probably settle, among other things, questions as to the inaccuracy of dates on 'the proceedings, memoirs, and other publica ons of scientific societies,' which Dr. Allen alleges, and of which I must say, I was quite unaware. E. D. COPE.

PHILADELPHIA, December 3, 1896.

SCIENTIFIC LITERATURE.

A History of the Warfare of Science with Theology in Christendom. By ANDREW DICKSON WHITE. 2 vols. Pp. xxiii, 415; xiii, 474. New York, D. Appleton & Company. 1896.

The title of this book describes its general character. Its range is indicated by the caption of its successive chapters. These embrace the development of Cosmology, Geography, Astronomy, Meteorology, Geology, Anthropology, Archæology, Ethnology, Chemistry, Medicine, Hygiene, Abnormal Psychology, Comparative Philosophy and Mythology, Political Economy, and Biblical Criticism and Theology. A large field for any one investigator to traverse! Yet such is the author's wealth of scholarship that he touches nothing without removing some obscurity, while important provinces are fairly flooded with light.

The book is of interest to the historian, the scientist, the theologian and the philosopher. But in estimating its value they must not forget the limits defined by the author. Dr. White does not, like Whewell, attempt to write a history of the sciences. Still less does he, like Harnack, essay a history of dogma. His theme, though more intensive, is less extensive. Dr. White concentrates attention upon the points at which the sciences, in the several crucial stages of their development, have come into conflict with the dogmas laid down in the creeds of Christendom. His book is a history of those collisions; and history being philosophy teaching by experience, Dr. White does not hesitate to apply its conclusions to the conditions of the present day. Nor is the author merely an historian of events in which he has no personal interest; on the contrary, the multitudinous victory of science over irrational dogmatism rejoices the lover of truth and evokes pæans unknown to the sober analytic historian. But this occasional triumph of the man over the historian does not detract from the historical value of the work. The greatest pains have been taken to secure accuracy; and the foot-notes show that innumerable libraries, both at home and abroad, have been consulted in the ascertainment and verification of the facts cited. Taking the text and notes together, the work may be fairly described as a kind of self-attesting encyclopædia; and as such it is likely to become, at least in the English-speaking world, the standard book of reference on the interesting subject with which it deals. Such books are not wont to be read through by many persons; but this one is likely to be often consulted by scientists who are interested in the early development of their specialty, by historians who deal with the progress of culture and civilization, and by theologians who care to see how the dogmatic apprehension of Christianity has been continuously modified by the inexorable pressure of the historical and natural sciences.

Dr. White makes it clear that the warfare of science is not waged against religion but against theology. The distinction between religion as a life and theology as a theory of that life is, from a logical standpoint, as clear as the distinction between digestion and physiology.