posely patted and praised it while the dog's eyes kindled ominously at the pretended neglect of himself. Suddenly the kitten jumped from my arms to the floor, and before I could interfere the dog had seized and shaken its little life out of it. I mention this as simply an instance. I believe that even birds show jealousy and sulk if too much notice is given a mate or a rival.

L. L. H.

BOOK-REVIEWS.

A Treatise on Plane and Spherical Trigonometry. By EDWARD A. BOWSER, LL.D. Boston, D. C. Heath & Co., 1892.

THE different treatises in Dr. Bowser's series of text-books are all characterized by an abundance of well-selected exercises. For class-room use this is a commendable feature. The accompanying texts, however, are often open to some criticism; they partake too much of the nature of compilations. It can be asserted that all such works are compilations to a greater of less extent, but such a claim is not always just. An author may go over the whole ground, making himself thoroughly familiar with his subject, then condense his materials, classify carefully, present in a comprehensive manner, allowing himself to be governed in all this work by well known pedagogical principles. Against a text-book prepared in this way this charge could not, in justice, be brought. In a prospectus issued along with the trigonometry, his publishers state that Dr. Bowser is accustomed to bring out, on the average, one new volume a year. Whether such a feat is a matter of pride on the part of the publisher or the author does not appear. At any rate, it furnishes an explanation of the weakness as well as the strength of the series.

As a general rule, a presentation of a science which varies greatly from the historic development is likely to be more difficult to master than one which does not. Some authors of trigonometries actually reverse the natural order. If the student could commence just where Hipparchus commenced, with the relation between arcs and chords, and be shown the advantage in the use of a table of chords, and then led from that to a table of sines and thence to the other functions, the subject would be learned in its true bearing from the start. It is true trigonometry was for centuries regarded merely as an introduction to astronomy, the result being that the spherical part was developed abnormally. But from the days of Regiomontanus (Cantor, II., p. 242) it was studied as an independent science and grew accordingly. As topics in a natural treatment of plane trigonometry we might have: Arcs and chords; chords and sines; sines and the other functions; these functions in the solution of right triangles, exercises; solution of oblique triangles by dropping perpendiculars, exercises. Principle of continuity; angles and functions in other quadrants; fundamental relations between the functions; derived relations. Addition and subtraction formulæ, including all formulæ which are easy consequences. Cases in the solution of oblique triangles, with exercises, deriving appropriate formulæ as needed. Logarithms; solution of triangles by logarithms, model arrangements, exercises. Solution of trigonometrical equations, De Moivre's theorem, and such other topics as it may be thought best to insert. It is a grave pedagogical mistake not to use the natural tables first, and until the student is made to *feel* the need of some labor-saving system. The use of the functions and the use of the logarithms are entirely distinct, and should be well separated from each other in the mind of the beginner. The natural tables were calculated to fifteen decimal places the century before Napier invented his logarithms. To sum up in one sentence, there should be more of historical evolution in the presentation of trigonometry.

Let us test the plane portion of the present work by the principles suggested. After giving the ratio definitions of the functions first, the student is plunged into the generalized conception of arcs and functions. Next the addition formulæ are given and all their corollaries, which means a considerable part of theoretical trigonometry. Next, logarithms and the log-function tables are

CALENDAR OF SOCIETIES.

Chemical Society, Washington.

Nov. 10.—F. P. Dewey, Crystallized Sulphite of Zinc; W. D. Bigelow, On the Viscosity of Sorghum Juices. Mr. Dewey's paper first reviewed the literatures of sulphite of zinc from Berthollet (1789) to Deniges (1892), showing that most of the early investigations were occupied with the complex action of SO_2 on metals, in which the production and examination of sulphite of zinc was merely an incident, and while some had produced the sulphite by the direct union of ZnO and SO_2, only a few had produced it by double decomposition. Two formulæ have been announced. The first $ZnSO_3$ $2H_2O$ was proposed by both Muspratt and Forclos and Gelis in 1843, upon meagre analytical data, followed, in 1844, by Dr. Koene with quite satisfactory results. In 1845, Rammelsburg announced the formula as $2\,ZnSO_3$ $5\,H_2O$, which was supported by Marignac, in 1857, in an elaborate and complete examination. Finally, in 1892, Deniges somewhat arbitrarily announced that the formula must be $2\,ZnSO_3$ $5H_2O$. Mr. Dewey's first results, which were all obtained by dissolving ZnO in SO_2 water, clearly and unmistakably supported the earlier (1-2) formula, but, on repeating Denige's work, the later formula (2-5) was obtained. Finally, from the same solution of ZnO in SO_2 water, both salts were obtained. By allowing the SO_2 to go off slowly, a crop of small, powdery crystals was obtained, showing the 2-5 formula. The mother-liquor from this salt was heated to drive off SO_2 quickly, when quite large and distinct crystals were obtained, which gave the 1-2 formula, thus showing that the salt crystallizes with two proportions of water, and that both formulas are correct. It was also found that sulphite of zinc heated with free access of air is completely decomposed and yields an oxide carrying less than 0.01 per cent of sulphur. W. D. Bigelow read a paper on the Viscosity of Sorghum Juices. About one hundred juices of different specific gravity were taken and the amount delivered by a 50 cubic centimeter pipette was carefully weighed. This was deducted from the true weight of 50 cubic centimeters of the juice and the result taken as loss due to viscosity. From this it was estimated that a 50-cubic centimeter pipette would deliver from 49.5 to 49.9 cubic centimeters of the juice. It was also noticed that the most varying results were obtained from different juices of the same specific gravity.

Biological Society, Washington.

Nov. 19.—Theobald Smith, On Certain Minute (Parasitic?) Bodies within the Red Blood Corpuscles; C. W. Stiles, The Topographical Relations of the Excretory Canals of Cestodes; David White, A Walchia from New Mexico; F. M. Webster, Some Entomological Factors in the Problem of Country Fences; F. V. Coville, Comparative Value of Plants in Determining Floral Zones.

Appalachian Mountain Club, Boston.

Nov. 9.—John Ritchie, Jr., The State Park on Temple Mountain, N.H.; John Coleman Adams, The Brook Path up Chocorua.

explained. Chapter V. treats of the solution of trigonometrical equations. Then the formulæ for the solution of right and oblique triangles are given in full, and a lot of theorems on inscribed and escribed circles with a large number of exercises. Finally, on page 166, the first right triangle is solved, by logarithms of course! Then follow the other cases in the solution of triangles.

The last two chapters of the plane trigonometry treat very properly of the construction of trigonometric tables and De Moivre's theorem. In a foot-note, De Moivre is called a French geometer. It is true he was born in France, but he should rather be styled an English mathematician. In another note (page 91), speaking of the Naperian system, the author says it is so called from the inventor, Baron Napier. He should have said it is so called *in honor* of the inventor of logarithms. He gives the date of the introduction of Briggsian logarithms as 1615. They were suggested to Briggs in 1615, or about that time, but they could not be said to have been introduced until two years later. It is odd that in such a small number of historical references the author should have contrived to make so many mistakes. He calls arc sin, etc., the French, when he might have described it as the continental notation. Referring to addition and subtraction logarithms, he names only J. Zech, Berlin, as compiler of such tables. One would expect reference to Gauss, if to any one. There are numerous minor points which are quite worthy of commendation, but, on the whole, in the writer's opinion, the trigonometry is not nearly as satisfactory as other volumes in the series.

AMONG THE PUBLISHERS.

THE Open Court Publishing Co. will issue for the holidays "Truth in Fiction, Twelve Tales with a Moral," by Paul Carus.

— Besides the serials which begin in the November and December numbers of the magazine, *The Century* has in preparation for the ensuing year many other important features, only a few of which can be mentioned here. "Good Roads" will be one of the subjects, the important matters of street-paving and railroad-crossings being treated by men well qualified to discuss the questions. Papers on educational institutions and methods in America are in preparation.

— The December *Atlantic* will contain a description of being "Alone on Chocorua at Night," by Frank Bolles, author of "Land of the Lingering Snow."

— A semi-centenarian: America's venerable and only weekly eclectic, *Littell's Living Age*. This standard weekly is the oldest concentration of choice periodical literature printed in this country. It holds a unique position in the magazine world — a monthly that comes every week — a single magazine that contains the cream of all. Those who desire a thorough compendium of all that is admirable and noteworthy in the literary world will be spared the trouble of wading through the sea of reviews and magazines published abroad; for they will find the essence of all compacted and concentrated here. Its prospectus for 1893 presents some special attractions and is well worth attention in selecting one's reading-matter for the new year.

— With the number for November, 1892, *The Century Magazine* began a new volume. In November is also given the first instalment of "The Letters of Two Brothers." This series consists of extracts from letters which passed between the late General Sherman and his brother, Senator Sherman, at critical periods in American History, and are edited by General Sherman's daughter. Other serials beginning in this number are on "Science and the Bible;" the first paper, "Does the Bible Contain Scientific Errors?" being by Professor Shields of Princeton; to be followed by "The Effect of Scientific Study upon Religious Beliefs." The December *Century* will be a thorough-going Christmas number, full of Christmas stories, Christmas poems, etc., and with many full-page and other illustrations.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York.]

For sale or exchange.—A Stevens' new model pocket shot-gun, 44 cal., with 22-cal. rifle barrel. Just the thing for collecting birds and small mammals. Will exchange for a 22-cal. cane-gun or good books on ornithology. Write for particulars, stating what you have for exchange. R. C. McGREGOR, 2841 Champa st., Denver, Col.

For sale.—A very fine stone sword (?) so named by myself. It is perfect—15 inches in length, a little over 2 inches in width, and ½ inch thick. It is of a dark slate color, perhaps limestone, and is the largest implement of the kind known. Some fifteen years ago, when it was not mine, I was offered $40 for it; since that time it has come into my possession; that price will now buy it. Address Rev. C. FOSTER WILLIAMS, Ashwood, Tenn.

For exchange. — Fine specimens of Wis. fresh-water pearls. I want books or papers on marine and fresh-water algæ; also classified specimens of same. I will exchange for Smithsonian reports or crystallized minerals. D. M. ANDREWS, Dodge Centre, Minn.

For Sale or Exchange.—The undersigned has a lot of first-class duplicate bird's skins and sets of eggs, both rare and common, for sale or acceptable exchange. Also about two hundred second class skins and five hundred eggs, suitable for study specimens, at very low figures. The latter, for starting a collection, are as good as the best, embracing all classes and nearly all families. Also about forty species of fossils, principally Devonian. MORRIS GIBBS, M.D., Kalamazoo. Mich.

For Exchange—"The Birds of Kansas,"—Goss, for Gray's Anatomy, or Medical Dictionary. Must be in good condition. Address, J. H. SIMPSON, Buchtel College, Akron, Ohio.

Wants.

A POSITION is desired in the South, preferably the Gulf States, where I can teach the sciences. Can also instruct in other branches. Salary only nominal, as I am simply desirous of employment while spending the winter in the South. A private family preferred, but will accept regular school work if not too confining. MORRIS GIBBS, M.D., Kalamazoo, Mich.

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