

The outstanding features of the lectures may be summarised as follows:—Barrow regards a curve as the locus of a moving point, and makes its velocity at any moment the resultant of two velocities parallel to two fixed axes; one of these velocities is taken to be constant, and then the nature of the curve determines the other component velocity for any position of the moving point. Barrow does *not*, like Newton, consider the calculation of the variable velocity (\dot{y}); he constructs an infinitesimal triangle, and from this determines, generally by a sort of method of "exhaustion," the value of the subtangent, or some such finite segment, from which the position of the tangent can be inferred. Barrow's rule for differentiating a product accordingly appears in a form equivalent to

$$d(uv)/uvdx = du/udx + dv/vdx,$$

and similarly for a quotient. It may be added that Barrow gives (Lect. x., ex. 5) an analytical proof of a proposition equivalent to

$$d \tan x/dx = \sec^2 x,$$

and in this he neglects small quantities of higher order than the first. It is, therefore, practically certain that, if he had chosen to do so, Barrow could have written an algebraic treatise on the differential calculus; and to this extent Mr. Child's contention seems to us to be fully justified. Barrow was probably too enamoured of the old geometry to wish to do anything of the kind; and we may venture to think that he had no conception of the immense importance of an abstract, arithmetical calculus for mathematics in general. It is here that the value of Leibniz's contributions becomes so manifest, and it matters little how far he was really indebted to Barrow's lectures, of which he was known to have had a copy.

Mr. Child gives paraphrases (in modern notation) of the most important parts of the lectures, with notes of his own in different type. At the end we have a reduced facsimile of two pages of the original, and of a sheet of the original diagrams. So far as we have tested it, the paraphrase is satisfactory; p. 57, ll. 14, 16, "decreasing" and "decrease" should be "increasing" and "increase," and p. 66, last line, "that I know" should be "so far as I know," and there may be other similar slips. Altogether, Mr. Child may be heartily congratulated on the result of his six months' research. G. B. M.

OUR BOOKSHELF.

The Distances, Absolute Magnitudes, and Spectra of 734 Stars. Arranged for Use with Ordinary Star Maps by T. E. Heath. Pp. iv+52. (Tenby: Sold by Miss Crealock, South Cliff Street, Tenby, n.d.) Price 2s. 6d. net.

THE determination of the distance of a star, by measuring its minute change of position when seen from opposite points of the earth's orbit, is an extremely laborious work. According to Mr.

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Heath's pamphlet, the parallaxes of about 700 stars constitute the total output up to now from the various observatories of the world; and for many of these the only information obtained is that the star is at a great but unknown distance beyond the reach of the method. The general fate of these data is to fall into the hands of some mathematical astronomer, apparently actuated by an irresistible impulse to add things up and take the mean; then comes a sudden jump to mathematical formulæ; integrals gather in formidable array, and the error-function makes its inevitable appearance; and so the riddle of the universe is slowly disentangled—or knots itself tighter—to the great satisfaction of those who have any notion what it is all about.

Mr. Heath is one of those who would rescue the precious knowledge from this socialistic use. For him the stars each have their individuality; they are personal acquaintances, not mere items on a census-form. When he looks at the Great Dog, in his mind's eye he sees Sirius a modest star of 30 sun-power eight miles away (to use his "Road-Book" scale), and its less conspicuous neighbour Beta, a brilliant globe of 750 sun-power 223 miles distant. Then turning to the gleaming belt of the Milky Way, on the same scale, "if we took ship to America we might probably come to the beginning of the Milky Way before we arrived, and get through it before we came to the Pacific." And so he places out the stars at their different distances and gives the true measure of their brightness.

There must be many watchers of the skies to whom the stars will acquire a new interest from the information here set out. It has hitherto been practically inaccessible except to specialists. Mr. Heath does not conceal the fact that the individual results are often very uncertain; they are taken from the best authorities, but it is only for exceptionally near stars that the distances are known at all closely. But we can agree with him that on the whole a true general view is conveyed. We are glad to learn that the author has presented a large number of copies to the Admiralty for distribution among the Fleet. A. S. E.

The Road and the Inn. By James John Hissey. Pp. xviii+435. (London: Macmillan and Co., Ltd., 1917.) Price 10s. net.

THE latest addition to Mr. Hissey's already long list of travel books will delight every lover of English byways. In a small motor-car, provided with camera and brush, Mr. Hissey went from lane to lane from Eastbourne to the Dukeries, Rugby being his most westerly, and Dunwich his most easterly, visit. There was no hurry and no bustle; and he preferred the country inn to the town hotel, for his "aim was to get into the heart of the real country." The serenity and charm of his gossipy narrative show how well he succeeded in securing the quiet holiday he desired; and the beauty of his photographs and drawings indicates his re-discovery of some of the hidden glories of the English countryside.