

the figures of the general appearance are good, but the sketches of details, as, for instance, the utricles, are too small to help much in determination of species. They would be more satisfactory if they were drawn natural size or larger. The book is written in English.

An Arithmetic for Schools. By J. P. Kirkman, M.A., and A. E. Field, M.A. Pp. lxvi + 492. (London: Edward Arnold, n.d.) Price 3s. 6d.

THE distinguishing characteristics of this book are simplicity and great clearness of exposition. The first two chapters deal mainly with our terrible English system of weights and measures, and in this lawless region no skill on the part of an author can be of service to the beginner. Once this tangled wilderness is passed, however, the skill of the authors in exposition comes into play. The treatment of common measures and multiples and the various rules for ascertaining rapidly whether a given number is or is not divisible by specified numbers are very clearly and successfully explained. The philosophy of the rules for the division and multiplication of vulgar fractions is very plainly set forth, and the rules for the contracted multiplication and division of decimals are well explained and illustrated near the end of the book. We have also an account of the metric system, followed by numerous examples of "practice." After this we have the calculation of areas and volumes, and an adequate exposition of the method of extracting square and cube roots. This is followed by the treatment of interest, stocks, and the various branches of the subject which are found in all arithmetical treatises, and then comes an enormous collection of examples. An appendix explaining and illustrating the use of squared paper for the comparison of scales and other kinds of calculation forms a useful and interesting conclusion.

The work is one which can be very confidently recommended to all teachers and students of arithmetic.

A First Step in Arithmetic. By J. G. Bradshaw, B.A. Pp. vi + 166. (London: Macmillan and Co., Ltd., 1902.) Price 2s.

ONLY the first four rules, simple and compound, are covered by this book, but the exercises upon them have been so carefully selected and arranged that children who receive instruction through them will acquire an intelligent and working knowledge of simple arithmetic. The exercises are arranged for both oral and paper work, and there is no doubt that the combination of the two methods of teaching the subject gives the best educational result. In most text-books of arithmetic, the pupils are discouraged at the outset by exercises and problems beyond their comprehension, but Mr. Bradshaw deals with amounts which beginners will have no difficulty in grasping and will work out successfully. An essay containing hints on methods of presenting the early rules of arithmetic, which occupies the first twenty-nine pages, contains some notes of service to inexperienced teachers of children; but they are out of place in a pupil's book, and belong rather to a volume on the practice of teaching.

The Real Origin of Religion. By Jabelon. Pp. 48. (London: Simpkin, Marshall and Co., Ltd., 1902.)

THE object of this pamphlet is to establish the not very novel or fortunate hypothesis of the phallic origin of all religious symbolism. The proofs offered are of three kinds, none of which possesses any real cogency. Certain savage tribes attach great importance to circumcision and other mutilations of the sexual organs, the reason for which is unknown. Therefore, the author argues, all primitive ceremonialism must be of sexual significance. This conclusion is supported by a number of etymologies, all unscientific and demonstrably false, and by an obscurely worded attempt to interpret the vision of Ezekiel as an account of the anatomical structure of the brain. The scientific value of the farrago is precisely nil.

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LETTERS TO THE EDITOR.

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Re Vegetable Electricity.

I AM reluctantly obliged to traverse a statement made by Prof. J. C. Bose (in the *Journal* of the Linnean Society of July 21, p. 304, footnote) to the effect that "Dr. Waller has subsequently been able to confirm the results which he (Dr. W.) heard me describe on the occasions referred to (Royal Institution, May 10, 1901; Royal Society, June 6, 1901).

I am compelled to state that Prof. Bose, previously to these dates, visited my laboratory on several occasions, received every facility that I was able to afford him as regards the methods by which I was and am investigating the physiological properties of animal and vegetable protoplasm, and *inter alia* heard from me, and has doubtless forgotten, the statement that the electrical response of plants is a general property of vegetable protoplasm, and not confined to such plants (*dionæa*, *mimosa*, &c.) as exhibit obvious movements.

Prof. Bose obtained (with my full approval) from my laboratory-mechanic the principal instruments used by me in such investigations, has imitated some of my experiments, and has gradually adopted their guiding theory. He is not entitled to make the statement quoted above.

AUGUSTUS D. WALLER.

P.S.—In connection with this subject of vegetable electricity I may take this opportunity of commenting upon two series of observations that have been made in Germany in contradiction of some of my principal conclusions.

Prof. Adami, of Hof, quotes from the German translation of 1899 of my "Lectures on Animal Electricity," published in 1898, the following passage:—"Verbindet man zwei Punkte A und B der unverletzten Kartoffel mit dem Galvanometer, so lässt sich kein merklicher Strom nachweisen; sobald aber die Kartoffel an einem Punkte B durch einen Messerschnitt verletzt wird, schlägt der Lichtfleck nach rechts aus, infolge der chemischen Thätigkeit und elektromotorischen Kraft, die durch den Schnitt erregt worden sind. Man beachte, dass dieser Versuch, im strengsten Sinne des Wortes, eine Vivisektion ist. Für unseren Zweck muss die Kartoffel lebendig sein. Die Wirkung bleibt vollständig aus, wenn die Kartoffel durch kochen getötet worden ist."¹

He then proceeds to give an account of a considerable number of experiments contradictory of the above statement. Prof. Adami, of Hof, did not use unpolarisable electrodes, but copper pins. It is not surprising that he should have failed to observe any signs of vegetable electricity.

Dr. Arthur Tompa, working in the Botanical and Physiological Institutes of the University of Halle, under the direction of Prof. Bernstein and Prof. Klebs, and with the advantage of the knowledge and experience of Dr. Tschermak, quotes on p. 100² the ten headings of my communication at the Turin Congress on Vegetable Electricity, and quite correctly selects for reinvestigation as being the general and most important topic, paragraph 5, "The Electrical Response as a Measure of 'Vitality.'" He devotes much time and care to this reinvestigation, and somewhat reluctantly comes to the conclusion that Waller's blaze reaction is a fallacy arising from the fact that Waller has followed erroneously the direction of current. He devotes a diagram and a page of description, p. 104,³ to his hypothesis in explanation of this imaginary blunder. I do not think that I have mistaken the direction of current, or that Dr. Tompa could have supposed that I was liable to do this if he had been at the pains to look at any of the diagrams in any of the papers of mine that he quotes.

Dr. Tompa should also have noticed in any of these papers that I have always spoken of excitation by induction currents and by condenser discharges. He has used the direct current of one or more Daniell cells. I have never done this for the reason that such currents give predominant polarisation counter-currents on living and on dead tissues alike. The blaze

¹ Sonderabdruck aus dem ii. Bericht des nordoberfränkischen Vereins für Natur-Geschichts- und Landeskunde.

² A. Tompa, *Beiträge zur Pflanzlichen Elektrizität* ("Botanisch. Beiheften," original arbeiten).

³ *Ibidem*.