plates of structural details have been added, two of which are devoted to the structure of the mouth in the principal genera of bees. The first, however, which includes details of general structure, very carefully indicated, will prove of the greatest value to entomologists taking up the study of the order *Hymenoptera*. There is a larger edition of the work, with coloured plates of the various species; but of these we cannot speak, as they are not before us while writing. We hope that Mr. Saunders' labours may induce many residents in the country to take up the study of the order *Hymenoptera*, and ultimately to extend their researches beyond *Aculeata* to the far larger and much more neglected, though hardly less interesting, section of *Terebrantia*, which includes the sawflies, gallflies, ichneumons, &c. The parasitic groups are so numerous as to render the *Hymenoptera* probably the largest of all the orders of insects, though they have hitherto received far too little attention from British entomologists.

Ostwald's Klassiker der exakten Wissenschaften, Nos. 67 to 75. (Leipzig: Wilhelm Engelmann, 1895–96.)

WE have before us nine volumes recently added to Prof. Ostwald's very handy and useful series of reprints and German translations of classical papers. No. 67 is A. Göpel's "Theoriæ transcendentium Abelianarum primi ordinis adumbratio levis," published in 1847. This is edited by Dr. H. Weber, and translated into German by Dr. A. Witting. No. 68 should be of interest to chemists, for it contains papers by Lothar Meyer (1864–69) and Mendelejeff (1869–71) on the "Natürliche System der chemischen Elemente." This volume is edited by Dr. Karl Seubert, who adds to it some notes on Newland's work in connection with the discovery of the periodic law. A translation of Maxwell's papers on Faraday's lines of force, read before the Cambridge Philosophical Society in 1855–56, appears in No. 69 of the series, edited and annotated by Prof. Boltzmann. The following volume (No. 70) is taken up with Seebeck's papers (1822–23) on "Magnetische Polarisation der Metalle und Erze durch Temperatur-Differenz," its editor being Dr. A. J. v. Oettingen. No. 71 contains Abel's investigations of the series

$$1 + \frac{m}{1}x + \frac{m(m-1)}{1\cdot 2}x^2 + \frac{m(m-1)(m-2)}{1\cdot 2\cdot 3}x^3 + \ldots$$

published in Crelle's *Journal* in 1826. In the volume entitled "Chemische Analyse durch Spectralbeobachtungen" (No. 72), Kirchhoff and Bunsen's contributions to spectrum analysis in 1860 are reprinted, with two coloured plates and seven figures in the text. The editor of this volume is Prof. Ostwald. Under the title "Zwei Abhandlungen über sphärische Trigonometrie" (No. 73), translations, by E. Hammer, are given of two papers by Euler—one on the outlines of spherical trigonometry (1753), and the other on general spherical trigonometry (1779). In No. 74, German readers have provided for them a translation of Berthollet's discussion of the laws of affinity (1801), edited by Prof. Ostwald. Finally, Prof. Groth edits a German edition of the work of the Finland mineralogist, Axel. Gadolin, on the "Herleitung aller krystallographischer Systeme mit ihren Unterabtheilungen aus einem einzigen Prinzipe," which forms No. 75 of this valuable series. Our only regret is that English readers have not a similar collection of edited reprints and translations of scientific classics.

The Metric System of Weights and Measures. By G. T. P. Streeter, B.A. Pp. 43. (London: Gee and Co., 1896.)

THIS short treatise is not only concerned with the metric system, but also contains "certain arithmetical principles, problems and formulæ, and an appendix on the common chemical reactions." The arithmetical contents may be useful as a supplement to ordinary books on arithmetic, but the statement of chemical reactions is "cram," pure and simple.

LETTERS TO THE EDITOR.

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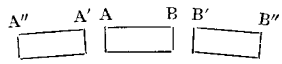
The Stress in Magnetised Iron.

MR. WILBERFORCE'S letter (NATURE p. 462) raises some points I ought to notice. In treating of the stress and strain, my phraseology has, I think, been extremely "unmaterialistic," in the sense that I have said little or nothing about a magnetic "ether," and have employed rather the language of action at a distance. Maxwell doubtless would have put things very differently, but my own experience has been that when one wishes to avoid confusing ordinary people on such questions as the sign of a stress or strain, the less one says about "ether" the better. My discussion of Maxwell's electrostatic medium (*Proceedings* Edinburgh Math. Soc., vol. xi. p. 107) will show, I hope, that his standpoint is not unfamiliar to me. The question really at issue is the existence and sign of certain strains in *iron* and other gross materials, and I judged Prof. Ewing's mode of presenting the case, which I practically followed, to be as clear as any. If strict Maxwellians object to the association of his name—which I did not originate—with stresses answering to the strains in question, by all means let us use another term, say "Q stresses," so long as their existence is queried.

In the accompanying figure—slightly modified from that on p. 270—suppose for the moment A″ A′, AB, &c., to be straight lines. The conclusion I reached that the stress on the element AB of a uniformly magnetised bar, with air gaps AA′, BB′, is a *tension* meets, I am glad to see, with Mr. Wilberforce's support. This



implies his belief that the reasoning of Mr. Shelford Bidwell (*Phil. Trans.*, 1888, pp. 216, 217), Prof. Ewing ("Magnetic Induction," § 145), and Dr. More (*Phil. Mag.*, October 1895, pp. 349, 350)—who in the places cited have treated the existence of air gaps as immaterial—should have led them to the conclusion that "Q stresses" exist, and that they cause a *lengthening*, not a shortening, of magnetised iron.

Mr. Wilberforce's reconciliation of Prof. Ewing's present views with my own is based, I rather fear, on a fallacy. Let us consider the accompanying figure, still supposed to represent a straight uniformly magnetised bar.

When gaps AA′, BB′ exist, there must, as Mr. Wilberforce says, be forces at A″, B″ to balance the attractions exerted by AB. Let, however, A′ move up to A, and B′ to B, and equilibrium will still exist when the forces at A″, B″ are supposed to be reduced to zero. Hence, Mr. Wilberforce argues, in a continuous bar the "Q stresses" at A and B cease to exist. Let us push the argument a little further. Equilibrium will still exist when equal pressures of any magnitude are applied at A″ and B″, so that apparently the conclusion to be deduced is that the "Q stresses" are pressures *wholly arbitrary in magnitude*, which Euclid, I fear, would have declared to be absurd.

The explanation of the paradox is, I think, that when we treat A′A″, B′B″ as finite, we must suppose the conditions such as to maintain unaltered the state of uniform magnetisation originally postulated, and this does not leave the magnetic stresses at A″ and B″ arbitrary. We may of course use a magnetic bar for transmitting stresses other than the "Q stresses." For instance, if we employ two magnetising coils, carried by the bar itself, their mutual attraction or repulsion will introduce stress into the bar. (This is, I think, analogous to the case of glass and tinfoil introduced by Mr. Wilberforce.) All such stresses must be allowed for, but I think it is expedient when possible to avoid confusing them with the "Q stresses."

Mr. Wilberforce seems to me to attach too much importance to the criterion of equilibrium. The equilibrium of the element AB in the figure would be equally secured whether the stresses transmitted across the air gaps were pressures or tensions.

My illustration of the rotating anchor ring was introduced because Prof. Ewing seemed unable to realise the existence of a uniform stress—whether tension or pressure—in a simpler system than that composed of an outer hollow ring pushing or