

geometry, the better. The gradient is too steep in the trigonometrical portion.

(9) Why does Mr. Sandon use the title "Mathematical Tables"? In reality the booklet seems to be intended as a pocket cyclopædia of much, if not all, knowledge. In 96 small pages we get treatises on arithmetic, algebra, mechanics, calculus—gamma functions are also included—astronomy, insurance, geology, philology, chemistry, earthquakes, the Morse code, the size of wall-paper, ship watches and bells, and Suffolk and Essex measures of butter and cheese, to name only a selection. The book may be useful, but the mathematical portions are hopelessly marred by misprints.

S. BRODETSKY.

### Miscellanea Physica.

- (1) *La Loi de Newton est la Loi Unique: théorie mécanique de l'Univers.* Par Max Franck. Pp. iv+158. (Paris: Gauthier-Villars et Cie, 1921.) 12 fr. 50.
- (2) *Fluoreszenz und Phosphoreszenz im Lichte der neueren Atomtheorie.* Von P. Pringsheim. Pp. viii+202. (Berlin: J. Springer, 1921.) England, 144 marks; Germany, 48 marks.
- (3) *La Physique théorique nouvelle.* Par Dr. J. Pacotte. Pp. viii+182. (Paris: Gauthier-Villars et Cie, 1921.) 12 fr. net.
- (4) *Mécanismes communs aux phénomènes disparates.* Par Prof. M. Petrovitch. (Nouvelle Collection Scientifique.) Pp. v+279. (Paris: Félix Alcan, 1921.) 8 fr. net.
- (5) *Über Äther und Uräther.* Von P. Lenard. Pp. 56. (Leipzig: S. Hirzel, 1921.) 9 marks.
- (6) *Physikalische Rundblicke. Gesammelte Reden und Aufsätze.* Von Max Planck. Pp. iv+168. (Leipzig: S. Hirzel, 1922.) 60 marks.
- (7) *Physique élémentaire et théories modernes.* Par J. Villey. Première Partie, Molécules et Atomes: États d'équilibre et mouvements de la matière (Mécanique, Statique des fluides, Chaleur, Élasticité et Acoustique). Pp. x+197. (Paris: Gauthier-Villars et Cie, 1921.) 15 fr.

(1) THE following are the first and the last statements in M. Franck's "loi unique." "Tout volume est composée d'une somme de positif qui est son potentiel et de négatif qui est sa masse. . . . Ces variations de potentiel dans l'éther sont elles-mêmes déterminés directement ou indirectement par l'Esprit." This law "nous supposons capable de tout expliquer"—everything, from the origin of the universe, through Boyle's law, to the constitution of electricity. Such books are the despair of the reviewer. If they are frankly denounced as nonsense, a cry is raised

about an obscurantist hierarchy impervious to all new ideas; while a careful analysis of them with a view of discovering whether anything valuable is concealed in the tangled mass of verbiage requires an enormous expenditure of time and labour. We announce therefore that we have not read M. Franck's book, and do not intend to read any book which aims at subverting the foundations of physics unless the author tells us, in terms of its language and concepts, exactly in what respect he finds its conclusions unsatisfactory.

(2) At the other extreme in this miscellany is Dr. Pringsheim's monograph. It is a summary of all important work on phosphorescence and fluorescence between 1908 (the date of the summary in Kayser's Spectroscopy) and March 1921, the experiments being interpreted so far as possible according to Lenard's theory modified and expanded in accordance with that of Bohr. The author's name is a sufficient guarantee of excellence, and it is unnecessary to say more than that the work is worthy of his reputation and of the traditions of German book-production. The book has a special and melancholy interest in that it is the product of the author's internment for five years in Australia, whither he had gone to attend the British Association meeting as a guest of the Australian Government. He is naturally bitter about his treatment, and every one must agree that the incident was exceptionally unfortunate; but alas! war is a succession of unfortunate incidents.

(3) Intermediate between these extremes is M. Pacotte's volume, which is "un essai historique, critique et méthodologique" on the new physics. M. Borel in his preface suggests that nobody has the right to criticise an attempt to compress so much matter within 200 pages who is not prepared to perform the task better himself; and we accept his suggestion in so far as we shall make no attempt to discuss whether, in his capacity as historian, M. Pacotte has always traced the true line of development. But criticism and "methodology" imply a point of view, and it is open to any one to suggest that the point of view is mistaken, without falling under M. Borel's ban; for if the point of view is wrong the book is not worth writing. We have no intention of declaring categorically that it is wrong, for science may be viewed from many standpoints, all of which are equally legitimate. But we think it right to indicate that M. Pacotte's standpoint is not that of the average physicist, nor yet that of the average philosopher; both of them will experience some difficulty in understanding what exactly is the task that M. Pacotte is trying to perform. His standpoint is perhaps more nearly that of the mathematician; but if the book is addressed to mathematicians it is surely a defect

and not a merit that it should be wholly free from mathematical symbolism. However, it is clear that M. Pacotte has read and thought deeply, and if we have to confess that the results of his labours are not very helpful to us, we are most ready to admit that they may be very helpful to others.

(4) Prof. Petrovitch here pursues the suggestive train of thought which he has started in earlier works. He begins with the familiar observation that physical metaphors are used in connection with the most diverse events; thus we speak of the *cooling* of enthusiasm or the *oscillation* of public opinion. Such metaphors indicate that the most diverse phenomena follow tendencies (*allures*) characteristic of mechanics. He seeks accordingly to classify these tendencies into a few well-marked groups and to place all phenomena of all kinds whatsoever within these groups according to the nature of their tendencies. These ideas (of which the briefest outline must suffice here) lead naturally to a scrutiny of the whole range of knowledge; M. Petrovitch's knowledge is wide and, so far as we can test it, accurate; yet he carries it easily. Accordingly his book will appeal to many who are not immediately interested in his epistemological theses.

We are inclined to think, however, that he overrates the importance of the resemblances he studies. Thus he maintains that when he has analysed any phenomenon according to its tendencies and displayed its mechanical analogies, he has explained the phenomenon in the sense used by Kelvin when he said that to explain a phenomenon was to construct a mechanical model of it. Such a doctrine we think might lead to the most dangerous fallacies if applied to psychology and politics; and though M. Petrovitch, confining himself to analysis and not to construction, seems always to stop short of the precipice, he approaches it very nearly and might well lead shallow thinkers over it.

(5) Prof. Lenard has republished in pamphlet form an article which appeared in Stark's "Jahrbuch." It is one more attempt to avoid the principle of relativity and quantum theory, and seems, as usual, to forget that it is impossible to avoid them entirely, because, since they are formal theories in accord with experiment, any other physical theory so in accord must be formally in accord with them. The basic idea of Prof. Lenard's theory is that every body has its private ether, disturbances in a private ether being transferred in some way (undefined) to a primary ether (Uräther) for transmission to a great distance. To those so attached to ethers that the idea is attractive of an infinite number of coincident ethers all moving at any point with different velocities, the idea will probably appeal. But we confess that we see no need for the Uräther; so far as we can see, private ethers would

suffice, together with the assumption that each observer can only perceive disturbances set up in his private ether. (Cf. *Phil. Mag.* 19. 189. 1910.)

(6) Prof. Planck publishes here a collection of his semi-popular lectures and essays, partly on radiation and quantum theory, partly on scientific principles. All that he says here will, of course, be familiar already to serious students, while for the general reader books in a foreign tongue are seldom useful. No comment therefore seems necessary; to praise Prof. Planck's work would be impertinent.

(7) Finally, we come to M. Villey's very interesting volume, of which the first part only is published as yet. Its intention is "A ceux qui possèdent déjà les connaissances normalement enseignées dans les traités de physique élémentaire, exposer les mêmes matières sous une forme assez renouvelée pour stimuler leur curiosité et élargir leurs points de vue" and "A ceux qui veulent acquérir ces connaissances en mettant à profit leur loisir, les présenter non sous l'aspect du manuel pédagogique, mais sous une forme plus attrayante et de lecture plus facile." It is the second object which appeals more directly to us and, we think, to the author. It is impossible for a professional physicist to decide definitely how far the aim has been achieved; we must "try it on the dog"; but we are certain that if the author has failed, his task is impossible and that the fault lies not with him but with the audience he is addressing. The book is a model of that simple, lucid, and logical exposition of which the French language—or at least the French people—alone seems capable. Every one, however deeply versed in physics, will find in it something to stimulate his interest and imagination. M. Villey deserves the thanks of all who desire a wider diffusion of scientific knowledge; we hope that an English translation will soon appear—if only somebody can be found with the courage and ability to undertake it.

N. R. C.

### Strasburger's Text-book of Botany.

*Strasburger's Text-book of Botany.* Rewritten by Dr. H. Fitting, Dr. L. Jost, Dr. H. Schenck, Dr. G. Karsten. Fifth English Edition Revised with the Fourteenth German Edition by Prof. W. H. Lang. Pp. xi + 799. (London: Macmillan and Co., Ltd., 1921.) 31s. 6d. net.

THE last English edition of this well-known text-book was published in 1912, and the appearance of the present volume will be welcomed by the large number of students and teachers who are already familiar with its many excellent features. This edition appears under a new title, as "Strasburger's Text-