

be placed after photosynthesis, and after the account of parasites and saprophytes; here it is noticeable that Lathræa is placed amongst carnivorous plants, without any mention of Groom's work. But few practical experiments are suggested, and it would be easy to improve the apparatus depicted in figs. 204, 206, 208, and 219. Finally, the last chapter, in which irritability is discussed, is headed "Movements of Plants," which quite ignores the phenomena of stimulus, and the stimulating source.

In the introduction, the authors state that they have been impressed with the need of a work which should contain all the information which is necessary for certain examinations. On the contrary, the present tendency, and there is much to be said in favour of it, is to bring out smaller books, written by specialists, which deal only with one branch of the subject.

*Traité de Chimie physique, Les Principes.* By Jean Perrin. Pp. xvi + 300. (Paris: Gauthier-Villars, 1903.)

THIS volume deals with the elements of dynamics, the thermodynamical potential, the phase law and other allied subjects of which a knowledge is indispensable to the modern chemist. The treatment is non-mathematical, but the author indulges in a good many discussions of a philosophical character. In defining the scope and aim of physical chemistry, he refers to the old style of thinking, according to which physics was the science of reversible phenomena, and chemistry the science of irreversible phenomena. The notion of *force* is defined by means of the extension of a stretched elastic string or wire. Why should not this treatment be adopted in books where relations involving mass and acceleration do not play a prominent part? We notice, as a useful feature, that Lord Kelvin's definition of absolute temperature is dealt with at some length. In the preface the author rightly directs attention to the desirability of abandoning such misleading notions as that of absolute in contradistinction to relative velocity, the statement that "heat cannot pass from a cold to a hot body," which is like speaking of an apple passing from one hand to the other, and the prevalent confusion of language in speaking of ideas involving force and energy.

*The Arithmetic of Elementary Physics and Chemistry.* By H. M. Timpany. Pp. 74. (London: Blackie and Son, Ltd., 1903.) Price 1s.

THIS collection of numerical exercises is very limited in its scope. It is composed of four sections; one includes problems on relative densities, another is devoted to examples on moments and centres of gravity, a third is concerned with the conversion of thermometric scales and with specific and latent heats, while the last deals with the calculation of the weights and volumes of the substances taking part in chemical reactions. Typical examples are worked out for the guidance of the student.

*Gisements minéraux. Stratigraphie et Composition.* By François Miron. Pp. 157. (Paris: Gauthier-Villars and Masson et Cie, n.d.)

M. MIRON here provides geologists and others with a compact account of numerous non-metalliferous mineral deposits which are useful in numerous branches of technology. A previous volume in the series known as the "Encyclopédie scientifique des Aide-Mémoire," to which the present book also belongs, dealt with those minerals in which the metallurgist is particularly interested, and attention is here chiefly directed to the natural sources of sulphur, nitrates, phosphates, borates, compounds of the alkali and alkaline earth metals, and other minerals.

NO. 1773, VOL. 68]

#### LETTERS TO THE EDITOR.

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#### Human Science and Education.

THERE surely never was a time when there was more need for consideration of the root-principles of higher education. It is generally allowed that we in England are behindhand in the matter, that we have allowed the Germans and Americans to have the start of us. And awaking to this conviction we have a difficulty in seeing in what direction we should move in an attempt to recover our lost ground.

I accede with pleasure to a suggestion of the Editor of NATURE that I should endeavour to lay before his readers some of my views as to the direction in which those studies which have *man* for their subject should move. At first sight it might seem that the present place is inappropriate for a paper of this kind. Yet it is among the students of nature that my contentions as to the study of man are perhaps most likely to find support.

What I plead for is that the two great branches of knowledge, the science of nature and the science of man, should be brought nearer together, that it should be recognised how much they have in common, and that the reasonable votaries of both should make common cause against the same enemies.

The enemy in higher education of the science of nature is the technical spirit, which will not take a wide outlook, which ties all investigation down to narrow points of practice, which does not see that breadth of study and imaginative insight are necessary in our schools of science if we would produce men of real efficacy for the work of the world and not mere technical experts. The enemy of the science of man is the spirit of convention, which is dominated by rhetoric and commonplace, which has no ambition to see the facts of human nature and of history as they really are, but interprets them by tradition by self-interest, by sentiment. And between these two enemies of the children of the light there springs up a natural alliance. The man who has received a narrow technical training may be a good linguist or the like, but is not likely to appreciate a wide humanistic culture. The man who has received a merely conventional literary education may master technical details, but will scarcely understand how the steady growth of science, of ordered knowledge, has changed our whole way of regarding life, religion or society. The two enemies will combine when they can to keep education at its present level, and to ridicule all attempts to provide a really scientific training in universities and schools.

It is scarcely necessary to say much in these days as to the importance of a thorough organisation of the study of nature and natural forces in our colleges. There has been in this matter extraordinary progress in the last thirty years. At any rate it would be an impertinence for me, who have never been trained in any branch of natural science, to dwell on this matter. But while natural studies have moved forward rapidly, those which concern man have in our universities scarcely moved. The course in humanity, and in modern history, is at Oxford almost exactly what it was thirty years ago. Cambridge is less averse to change than Oxford, and has been more mobile; yet it may be doubted whether human studies have imbibed much more of the modern spirit in Cambridge than at Oxford. In the new universities which are springing up on all sides, generally speaking the side of natural science is more or less well developed with teachers and apparatus, but in the matter of history, psychology, archæology and the like they are much to seek. In the case of the new University of London, one sees the germs of better things. Several of the schemes of study there arranged look well on paper. Only funds are needed to set the machine in motion. In London there are great institutions, like the Record Office and the British Museum, which are in the nature of things obliged to be scientific, and one hears great things of the London School of Economics.

I think the readers of NATURE will admit that the slow-