

tically admits Kirchhoff's thoroughly abstract, and so to say *a priori*, presentation of dynamics to be the best extant from a critical point of view; and he is conscious of the value of a self-consistent theory which can be applied as at least a first approximation to the actual facts of experience.

Another advantage of the work is that it does not pretend to be exhaustive. By choosing definite problems (such as impact, for example) and restricting himself to the consideration of really eminent writers, the author is able to give extracts of some length from works of great interest which are not generally accessible. In some ways this is more instructive than any amount of comment can be.

M. Jouguet stops short of hydrodynamics, and only gives very brief accounts of the principles of least action and least constraint. Otherwise most of the main principles of dynamics and statics are illustrated. The chapters on internal forces are particularly interesting; so is a passage from Euler, which shows that he was vaguely conscious of the difficulties connected with the relativity of motion, and the impossibility of defining absolutely fixed axes of reference.

One reflection is almost certain to occur to the reader of these volumes, namely, that one great advance in the study of natural science has been the rejection of sham proposition about cause and effect, and adequate causes, and so on. It is distressing to find an able man like Wallis giving definitions of the most question-begging description, and stringing together such propositions as "other things being equal, a heavy body has a preference for the path by which it can sink the furthest." However, these early pioneers had a remarkable power of solving problems by elementary principles which they used without being able to express them in a proper, or even intelligible way; and the modern theories of light and electricity once more illustrate the curious paradox that theories based on the undefined and undefinable have the power, not only of simplifying our accounts of phenomena, but also of suggesting paths of discovery, and leading to larger control of the energy surrounding us.

If M. Jouguet's work reaches a second edition, he will doubtless correct "Bernouilli" to "Bernoulli." In a work of this kind it is rather irritating to find this time-honoured blunder repeated once more.

G. B. M.

ORGANIC MEMORY.

Die mnemischen Empfindungen in ihren Beziehungen zu den Originalempfindungen. By Prof. Richard Semon. Pp. xv+392. (Leipzig: W. Engelmann; London: Williams and Norgate, 1909.) Price 9 marks.

THE theory of the Mneme, propounded by Prof. Semon, has attracted the attention both of psychologists and of those naturalists who are interested in the profound problems of hereditary transmission. It is founded on the statement, which everyone is ready to admit, that a stimulus must affect the quality of living matter in such a way that the matter is not the same as it was before the stimulus

acted. A permanent change, which, in a sense, may be called a memory, has been effected, or, to use the terminology invented by Semon, the action has been engraphic and the change itself is an engram. Repeated stimulation will make the engram more lasting. All stimuli then produce engrams, and the sum of the engrams of a living being is its mneme. Complex stimuli cause complex engrams, and if there is, under the action of some stimulus or other, a revivification of the complex engrams, then a condition termed ephoria is produced, and the assemblage of engrams is ephorized. If the new stimulus is in concord with the awakening of the complex engrams, this concord is termed by Semon homophonia, but if there is a discord, the homophonia may be restored in the case of psychical processes, by an introspective activity of the power of attention, or, in the case of a living organism, by regenerative processes acting ontogenetically, or by adaptation to the new conditions acting phylogenetically.

In this volume Prof. Semon discusses the theory with great clearness and commendable brevity, and he gives many illustrations. The theory may help to explain certain peculiar nervous conditions, as has been suggested by Dr. August Forel in his book on "Hypnotism." On the other hand, it may be of service to the naturalist in his ceaseless efforts to explain heredity, as was so forcibly put by Prof. Francis Darwin in his Dublin address to the British Association last year. Thus a stimulus may produce effects which radiate from the organised matter first affected to organised matter throughout the whole organism, either by nerve paths or by proplasmic intercellular filaments, and in this way faint engrams may be made on the matter of the reproductive elements, ova or spermatozoids. In some such way we may account for the transmission of acquired characters, a mode of thought, however, only to be ridiculed by those who hold that acquired characters are never transmitted. It may be said with much cogency that such a theory is only another method of arranging items of knowledge in one's mind; it is only an aid to memory and thought, without being a step towards an explanation. Although founded on well-known physiological facts, it rides off on the wings of the imagination, and it may be questioned if it really advances knowledge. Still, an ingenious theory is a stimulus and possibly a guide, and science is indebted to Prof. Semon for stating it in a succinct form in this interesting book.

JOHN G. MCKENDRICK.

THE PHYSICS OF THE ION.

Les Découvertes modernes en Physique. By Dr. O. Manville. Deuxième édition. Pp. iii+463. (Paris: A. Hermann et Fils, 1909.) Price 8 francs.

THE title of this work, "Les Découvertes modernes en Physique," since it is a single volume by a single author, is obviously incomplete. In effect the book is almost entirely, and might have been with great advantage entirely, confined to the relations between electricity and matter consequent upon the conception of the atomic charge and the isolation