

valve engine is well illustrated, and the description does credit to what is probably the most economical steam engine ever designed. A description is given of rotary engines, but none are illustrated. The "Rota" engine, designed and made by MacEwan Ross, of Glasgow, might have been included with advantage. The locomotive is outlined, and the compound type described; but no information as to tests is given, probably because no trustworthy data can be obtained; and as no British Railway Company, with one possible exception, is likely to build any more compound engines, it seems probable they are not the unqualified success they were originally claimed to be, although the Vaucain system, with four outside cylinders, appears to be a success in the States. But it must not be forgotten that the American rival is a very uneconomical engine when compared with our own.

N. J. L.

OUR BOOK SHELF.

Das Verhältniss der Philosophie zu der empirischen Wissenschaft von der Natur. By David Wetterhan. (Leipzig: W. Engelmann, 1894.)

THIS is the essay which gained the prize of 1000 marks offered, in 1891, by the Philosophical Society of Berlin. It consists of 110 pp., of which about twenty are occupied by notes and abstracts from various writers, in small print.

Naturally, in giving forth his own views, some of which possess considerable originality, the author makes continual and extensive use of the theories of Kant, Schopenhauer, Wundt, Bunge, and others; and one noticeable feature about the work is the full share of recognition accorded to English philosophers and scientists, such as Faraday, Herbert Spencer, Darwin, Romanes, and Huxley. The writer well remarks that the limits of scientific knowledge are everywhere and nowhere.

In the earlier pages the author discusses the relation between the physical and the psychical sides of nature. The theory of the conservation of energy has nothing to do with mental processes: it governs the quantitative relations of all processes of nature, but does not explain their qualitative differences. Sensation, consciousness, motor impulse, are not forms of energy, and do not correspond to them, but to the causes of qualitative changes in forms of energy.

The world of psychics cannot be separated from that of physics, and we must look forward to the future progress in the latter science to bring the qualitative changes into connection with the theory of the conservation of energy. The author shows by a very simple example—"Shall I kill that spider, or leave it alone?"—the effect of his will on surrounding nature; and the divergent effects thereon which would result from each of the two alternative modes of procedure.

Memory he believes to be caused by an impulse of a certain kind, producing in the particular arrangement of the smallest particles in the ganglion cells and nerve fibres a modification in the same direction as was produced by the original impulse, and resulting in corresponding physical phenomena. But he acknowledges that, at present, we cannot explain "brain oscillations."

The principle of evolution sheds a light upon the psycho-physical problem: physical development is not the cause but the effect of psychological development, and the modifications in the brain and nervous system throughout the animal kingdom are intelligible as resulting from psychical causes, whereas the physical causes, if

they exist, remain hidden. He considers that even in palæontology we can detect traces of this psycho-physical process by the examination and comparison of the cranial capacity of the skulls of extinct reptiles and mammals. As man is the culminating point in mental development amongst mammals, so is the ant amongst insects; but clearly this position has in each case been attained independently, and is independent of the structure of the nervous system. The inheritance of acquired characters is discussed, and the old difficulties presented by a disbelief in it are once more brought forward; and especially the difficulty in the adaptation of terrestrial mammals to a life in water, such as must have occurred in the ancestors of the Cetacea. The author endeavours to show that the principle of progressive psycho-physical development may admit of a vital-mechanical explanation, if the transference of acquired characters, as a consequence of changed functions, is possible for "keimplasma."

The author is apparently a practical man of science, and not a mere arm-chair philosopher; he fully recognises that philosophy must be based upon scientific experiments, and quotes Huxley's words, "The Laboratory is the forecourt of the temple of Philosophy."

Meteorology, Practical and Applied. By John William Moore, B.A., M.D., M.Ch., F.R.C.P.I. (London: F. I. Rebman, 1894.)

IT is to be hoped that this little book may meet with the popularity it deserves. Well written and well illustrated, it ought to recommend itself to that numerous class of whom some knowledge of meteorology is now required. The author, a medical practitioner, has evidently, first of all, but by no means exclusively, sought to interest medical officers of health and those who seek a qualification in preventive medicine and its allied branches. Writing for such students, the author has prudently not burdened his work with technical terms, or attempted to discuss with any completeness the general motions of the atmosphere depending upon the application of thermodynamics. Neither does he fall entirely into the popular and pleasing style of writing; though he does seek legitimate interest by exhibiting the many points in which meteorological inquiry bears on social and sanitary science, how it may benefit the agriculturist, protect the traveller, or instruct the physician.

The book is divided into four sections. In the first we find a very full and, considering the source from which it is drawn, probably accurate account of the history and development of the United States Weather Bureau. It seems to have occurred to the author, that if he shows to the reader at an early stage the interest and devotion which the shrewd American gives to this subject, he will convince him that there is something in meteorology after all, beyond the dreary and wearisome accumulation of barometer and thermometer readings. Then we have, of course, the description of the necessary instruments in use, with their corrections. We are glad to see in this section due prominence given to Mr. Aitken's interesting work on atmospheric dust; and in the chapter on evaporation we notice that Mr. Apjohn's formulæ are given correctly, which is not the case in some other well-known elementary works. The third section of the book treats of climate and weather, a section that might with advantage have been made fuller; but in reviewing the whole subject of meteorology within moderate compass, it is necessary to curtail somewhere. The last section considers the influence of season and weather on disease. Here the author is apparently on very familiar ground, and the small space devoted to this topic is full of interest and suggestion. There are one or two slips in the text, as, for instance, on page 10, where the oft-repeated