SCIENCE

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE GROUNDWORK OF DYNAMICS.*

THE subject of dynamics is too often treated as if its chief value consisted in the opportunities it affords for familiarizing the student with the operations of the differential and integral calculus. It is regarded as a department of applied mathematics rather than of mechanical science. That this should be the case is unfortunate; at the same it is not in the nature of things altogether avoidable. The student cannot afford the time involved in deferring the study of dynamics until he has acquired a working knowledge of the calculus. As a consequence he becomes confused respecting the origin of his difficulties, and possibly attributes to his ignorance of mathematics misconceptions the nature of which may be purely dynamical. It would be of great benefit to him to have the opportunity of attending, before the close of his studies, a short course of lectures on the fundamental principles of the subject, that is to say, the conceptions springing directly from experience, upon which the science is founded. The mind of the individual resembles in its mode of growth the mind of the race. The study of the historical development of mechanical ideas will go a great way in clearing up difficulties which arise from adhering too closely to one line of thought. Many of the greatest advances in science are the result of changes of the point of view. Such changes correspond in some measure with the process known to the mathematician as the transformation of coordinates, a process which often transforms a mass of brain-wearying symbols into ordered groups, instinct with life and

* Address by the Vice-President before Section D. of the Detroit Meeting of the American Association for the Advancement of Science.