Another component is similar to the X-rays, and is probably a phenomenon of the ether rather than of ordinary matter. Perhaps this component is produced by the action of the first component, as the X-rays are produced by the action of the kathode rays. For the rest no satisfactory explanation has been given. Many of the secondary effects seem to result from a fine dust emitted from the radio-active substance. Possibly there is only a single primary radiation, the rest being secondary effects, as the kathode rays generate the X-rays and these in turn generate their complex secondary radiations.

The chemical nature of the radio-active substances or elements is still little understood, nor is it surprising when one considers the difficulty of working with substances occurring in such minute quantities as these. Only one new element, radium, is definitely established. Hofmann and Strauss thought they had isolated another new radio-active element, but while still claiming the new element, they now admit that it is not radio-active.

The question of the source of energy in these radiations is yet unanswered. Is the energy potential in an unstable molecular or atomic structure, or is it supplied continuously by outside sources? In the first case, how long will the energy last? In either case, is it a property that matter in general may under proper conditions assume, or is it, as it seems, restricted to a very few peculiar elements? Heat or cold, high or low pressure, has little influence on the emission of the rays. Mme. Curie once put forth the hypothesis that perhaps the radiation is induced in the radio-active elements by a sort of transcendental radiation more penetrating than the X-rays and pervading all our space. Professor Geitel found that if so the exciting radiations penetrate easily hundreds of yards of rock, for radium was still active at the bottom of the deepest mine to which he had access. Finally, the study of the radio-active substances will surely lead to a better knowledge of that which is the subject of much of the physical research of to-day, the intimate structure of matter.

GEO. B. PEGRAM.

COLUMBIA UNIVERSITY,
June 21, 1901.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

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SCIENTIFIC BOOKS.

Les problèmes de la vie. 1re Partie. La Substance vivante et la cytodiérèse. Par DR. ERMANNO GIGLIO-TOS. Turin. 1900.

A title, such as the author of the present volume has selected, is apt to excite suspicion by suggesting a discussion of phenomena for the explanation of which the data at our disposal seem at present hardly sufficient. The time when the biologist was content with an *ignoramus* or with the endeavor to conceal his ignorance under cover of vital force has passed away, and a school has arisen which pins its faith on the investigation of Entwicklungsmechanik, but which, it must be confessed, still subsists on the substance of things hoped for. The pendulum has swung from the predication of a special force to the application of the fundamental principles of physics and mechanics, but without as yet yielding the desired explanation of protoplasmic activity, possibly because the new position has not yet been sufficiently exploited.

Professor Giglio-Tos, however, believes that the lack of conclusive results is due to the pendulum having swung too far; the basis of an explanation of the phenomena of life is to be sought, in his opinion, not so much in the physical as in the chemical principles involved. The most fundamental of all the vital functions is assimilation and this he believes is exclusively a chemical phenomenon, perfectly analogous to the changes which organic chemical compounds may be made to undergo in our laboratories, acetic acid, for instance, if supplied with the proper food in the way of reagents, assimilating these and producing with their aid additional molecules of acetic acid. The example which he gives in illustration of the chemical nature of assimilation is so suggestive that it may be repeated here.