toxicological facts reported in the eleventh chapter, indeed, support this view.

The further inference from the theory, that very labile but not yet organized protein substances possibly occur in plants, has also been verified. An exceeding labile reserve protein of an aldehyde nature was proved by Bokorny and myself to exist in many kinds of plants; its characteristics are described in the ninth and tenth chapters.

Labile substances contain kinetic chemical energy; they contain certain loosely bound atoms, which under the influence of heat become more mobile than in case of a more stable arrangement. As a result chemical reactions are caused, the energy of these atoms being transferred to certain susceptible substances (sugar, fatty acids), which are thus drawn into a state of higher reactive power, especially with the otherwise indifferent oxygen of the atmosphere. In other words, catalytic actions are produced through a charge with chemical energy. The proteins of living substances appear as relatively firm structures in which separate labile atoms perform great oscillations. This conception is essentially different from that of Pflüger and Detmer, both of whom ascribe to all atoms in the plasma-proteins such an intense state of motion that a dissociation results, to be followed by a similarly energetic regeneration. Pflüger says:* "I do not expect to meet with any opposition if I consider the living matter as not only being astonishingly changeable, but steadily decomposing."

Yet, when we consider that a minimal attack of extremely small quantities of a poison will produce the death of a cell, one may well doubt whether such a metabolism as Pflüger assumes would not sooner lead to death than to a possibility of regeneration. Neither can we, therefore, agree with Verworn when he says:† "The life process is the sum-total of all processes connected with the building-up and destruction of the 'biogens,' or, "life consists in the metabolism of the albuminous bodies." A more correct definition would be the following: Life is the sum-total of the effects made possible by the labile nature of the plasma-proteins and their respiratory activity, and governed by the specific tectonic of the energides and of the active paraplastic structures.*

The nature of the living matter is in the first place determined by lability and organization, that is, by a systematic kind of motion in a structure (tectonic) of labile proteins. The principle of organization is not yet known. Even if we assume with Pflüger that the process of organization consists merely in a polymerization, the complicated details in generation and karyokinesis, would still defy explanation, and the genetic differentiation would not become better intelligible. Difficult problems are here facing us. Still it may be considered a slight advance to know at least a little more about the cause of respiration and the chemical energy of the cells than formerly. It is the lability of the plasma-proteins, which, supported by the effects of light, leads to the building-up of the carbohydrates in the green plants out of carbon dioxide and water with separation of oxygen. It is also this lability which assists in combining the organic substances with oxygen and renders the obtained energy applicable to physiological work.

In addition to the well-known fact that all life functions are based upon the energies of the sun, it must be inferred that the lability of the plasma-proteins is necessary to transform this sun energy into vital action.

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* Pflüger's Archiv 10, p. 311.

† Allgemeine Physiologie, 2d edition, p. 509.

* Kupffer designates the contractile substance of the muscular fibrille, the nervous fibre and the red blood corpuscles as 'paraplastic' formations.

Physical Geography. By William Morris Davis, assisted by William Henry Snyder. Boston, Ginn & Company. 1898. Pp. 431.

Professor Davis well states in his preface the central principle of this volume: "Physiographic facts should be traced back to their causes and forward to their consequences." We find thus the widest departure from the piecemeal description and recital of facts, of most works in physical geography. We should expect this from one who has long been eminent as a student and teacher of the science and who

has not ceased to magnify the causal notion and the consequent educational value of geography. It cannot hereafter be said that the materials of the new geography are not available to the rank and file of teachers, as was conceded in the report of the Committee of Ten. The limits of a secondary text-book forbid anything like a full discussion, and it is to be hoped that a manual or college text-book may come from the author's hand. He has discarded, for the most part, technical terms. Thus the doctrine of the peneplain is elucidated in the text, but the name appears only once, and that in a foot-note. The rational geography makes large use of geology, but this has been done in a simple fashion which obviates the necessity of a previous course in that subject for the pupil, though the teacher would find such knowledge all but indispensable. To dwell for a moment longer on the pedagogical aspects of the volume, the vital teacher need not hesitate to use it, though he be deficient in preparation, but it is emphatically a book for the best, and only such can wholly do it justice. It wisely joins itself to the present state of knowledge, but leads well out among the ideals and possibilities of the science.

The illustrations are profuse and well selected. Especially useful are many diagrams which combine surface relief and vertical section, thus relating geographic form and geological structure. The appendix contains valuable bibliographic lists and a short catalogue of the best maps, whose use and importance are everywhere emphasized.

The Earth as a Globe, the Atmosphere, the Ocean and the Lands are the four main subdivisions of the book. All but the last are briefly treated, offering an outline of the chief facts in mathematical geography, meteorology and oceanography, terms which we think, for the present purpose, wisely discarded.

The lands are treated with greater fullness, the discussion occupying 273 pages. The chapter headings will best show the general character of this section. They are: The Lands, Plains and Plateaus, Mountains, Volcanoes, Rivers and Valleys, The Waste of the Land, Climatic Control of Land Forms, and Shorelines. The origin of these forms and their consequences upon organic and especially human life are never lost from view, and thus is realized the highest definition of geography as a study of the 'physical environment of man.' No separate sections are devoted to the races of man or the distribution of animals, but a reader of the whole volume will discover that these subjects have not been neglected, but have been treated in an intimate and educational fashion.

The principle of change of form by erosion and by change of relation to sea-level is early stated and receives manifold elucidation to the end. The Plain offers a good example of the author's method. We have first the formation of a coastal plain by deposition of land waste and uplift of marginal sea-bottom, with subsequent dissection by land streams. There logically follows the broader, higher, older and more dissected coastal plain, the eastern Carolinas serving as an example. The favorable conditions for artesian wells form here a naturally related topic. Embayed coastal plains show the effect of the later, partial submergence, the Chesapeake being used as a type. Such use of physiographic types, as a means of seeking and classifying examples in all parts of the world, is a favorite and important principle with our author. Similar plains of very ancient origin, as in central-southern Wisconsin and western New York, are then described and connected with the younger, less modified types, but without involving the difficult ideas or nomenclature of historical geology.

The plateau, or uplifted plain, appropriately follows. Thus we have young plateaus, as in Arizona; mature and well-dissected plateaus, as in the Catskill-Allegheny-Cumberland belt, and old plateaus, as recognized in the buttes, mesas and table-topped mountains of the West.

The treatment of mountains is, for the space, equally thorough and interesting. The various kinds are described—block mountains in various stages of maturity; folded and domed mountains, with such fruitful subtopics as climate of mountains, mountains as barriers, valleys among mountains, and inhabitants of lofty mountains.

The chapter on Rivers and Valleys well illustrates the strides of physiographic science dur-

ing the last score of years, as will appear from an outline of the chief topics. Thus we have young rivers, with lakes, falls and rapids as marks of immaturity; graded rivers and the development of valleys; meanders and the shifting of divides; mature and old rivers; revived, antecedent, engrafted and dismembered rivers, the causal or historical notion appearing at every stage of the discussion.

The general reader who desires to cultivate an appreciation for natural scenery will find help in Professor Davis's volume, and the student to whom most of the materials are familiar will find a convenient and systematic summary of the important facts and doctrines of a great and growing science.

ALBERT PERRY BRIGHAM.
COLGATE UNIVERSITY, February, 1899.

GENERAL.

The Bulletin of the American Mathematical Society states that advices from the Vatican announce that Abbé Cozza Luzzi, assistant librarian, has found Galileo's original manuscript treatise on the tides. The manuscript is in Galileo's handwriting and concludes with the words: 'Written in Rome in the Medici Gardens on January 8, 1616.' The currently accepted text, the original of which was supposed to have been lost, differs considerably from that of the manuscript just found. Pope Leo XIII. has taken the greatest interest in the discovery and has ordered the manuscript to be published in an elegant edition at the expense of the Vatican.

THE London *Times* announces that it will prepare a supplementary volume to the ninth edition of the Encyclopædia Britannica. This edition was published between 1875 and 1889. It is well known that the treatment of scientific subjects are in many cases the best accessible to English students, being prepared by leading English men of science. It is unfortunate that a new edition of the Encyclopædia cannot be prepared, as the last twenty-five years have brought many changes in all the sciences, but a supplementary volume will be of some service.

BOOKS RECEIVED.

A Handbook of Medical Climatology. S. EDWIN SOLLY. Philadelphia and New York. 1897. Pp. xii + 470.

Minerals in Rock Sections. LEA MCILVAINE LUQUER. New York, D. Van Nostrand Co. Pp. vii + 117.

Die Medial-Fernrohre. L. SCHUPMANN. Leipzig, Tuebner. 1899. Pp. iv + 145. Mark 4.80.

Die Lehre vom Organismus und ihre Beziehung zur Sozialwissenschaft. OSCAR HERTWIG. Jena, Fischer. 1899. Pp. 36. Mark 1.

Regeneration und Entwicklung. H. STRASSER. Jena, Fischer. 1899. Pp. 29. Mark 1.

Elementary Physiology. BENJAMIN MOORE. New York, London and Bombay, Longmans, Green & Co. 1899. Pp. ii + 295.

Primer of Geometry. JAMES SUTHERLAND. London, New York and Bombay. 1898. Pp. 117.

SOCIETIES AND ACADEMIES.

THE GEOLOGICAL CLUB OF THE UNIVERSITY OF MINNESOTA.

AT a meeting of the Club on February 25th Professor C. W. Hall discussed the extent and distribution of the Archean in Minnesota. First, accepting the Archean as that original 'crust,' or solidified portion of the earth, which is postulated in every existing view of the beginning of the geological record, he defined it as an era of igneous origins whose rocks represent the original crystallization of earth matter added to from below by successive solidification and many subsequent intrusions. By this definition all overlying clastics or irruptions into or through the clastics are excluded from the Archean. If the base of the clastics can be found there certainly should be found, locally, at least, the rocks upon which they lie. Such underlying rocks, the Archean, are believed to occur in Minnesota in two quite separated districts, the northern and the southwestern.

Along the international boundary most geologists have grouped all the rocks from Basswood Lake to Lake of the Woods as Archean, even when clastics have been clearly recognized and eruptives found breaking through them. Lack of care in delimiting the Archean upwards has caused much confusion. Lawson set an example in distinguishing between clastics, 'agglomerate schists' and the rocks underlying, though not necessarily those from which the clastics are derived. Structurally the