

not have acted at different times, — one that carries with it the fallacious conclusion that the lithological character of a rock is any reliable indication of its geological age.

Chapter viii., entitled 'A natural system in mineralogy,' suggests a new basis of mineralogical classification, and illustrates it in a new classification of the silicates. These are divided into three main groups, according as their bases are in the protoxide state (protosilicates), in both the protoxide and sesquioxide states (protopersilicates), or wholly in the sesquioxide state (persilicates). These groups are further divided into various tribes according to principles which cannot be explained in this place. Whatever may be the chemical merits of this system, it would appear to do serious violence to the crystallographic relationships of certain minerals, as may be seen in the wide separation of the members of the pyroxene and amphibole groups.

The three remaining essays are of an historical character, and contain a vast amount of information regarding the views which have been held on the subject of crystalline rocks. The first of these is a summary of the writer's report E of the Second geological survey of Pennsylvania, on the pre-Cambrian rocks in America and Europe. The second deals with the geological history of the serpentines, and develops the writer's idea that all serpentines are of aqueous origin, being of the nature of chemical precipitates. The chemical origin of a small and long-since buried bed of a serpentine-like deposit occurring in the Onondaga salt-group at Syracuse, N.Y., and of the magnesian silicates (sepiolites) of the Paris basin, together with certain reactions which are found to take place between the carbonates of lime and magnesia and free silica in heated solutions, are adduced as a proof that *all* serpentine is of chemical origin. There seems here to be a very partial and one-sided statement of the best authorities on this subject, for the origin of serpentine by the hydration of eruptive chrysolitic rocks will surely be disputed to-day by no one who has carefully and impartially looked into the matter. Though there may be truth in both hypotheses, there is more evidence in favor of the latter; so that here, again, the danger of accounting for all rocks of similar character by one set of causes becomes apparent.

The final essay is devoted to an elaborate review of the Taconic question and a statement of the writer's opinion that the Taconic of Emmons is a formation of the transition class, which unconformably underlies the Cambrian, and is separated from it by a great interval of time which includes the Keweenaw period.

Throughout, the book is interesting, — almost fascinating, — but nevertheless full of danger to any one who accepts it implicitly as a guide, or to the beginner who is not able to estimate it in comparison with the work of others.

REMSEN'S ELEMENTS OF CHEMISTRY.

IN the preface to his 'Elements of chemistry,' Professor Remsen states his opinion, that if a course in chemistry "does not to some extent help the pupil to think as well as to see, to reason as well as to observe, it does not deserve to be called rational." An essential part of his plan in this elementary course is the performance of experiments by the pupil, who is then to be questioned by the teacher concerning the results of the experiments, and the conclusions to be drawn from them. Appropriate questions are given in the book in connection with the description of each experiment, and a quite extensive list of questions and problems (not numerical) is appended at the end of the work. A number of experiments, with questions, illustrative of chemical change in general, are given at the outset, before even the names of the elements, or the distinction between elements and compounds, is imparted. The atomic theory and that of valence are treated briefly and clearly, special care being taken to prevent the too common confusion of facts and hypotheses in the young student's mind. A great deal of attention is devoted to subjects which are likely to interest the pupil by reason of their practical importance or their relation to his daily life. Such are the manufacture of soap and paper, fermentation, bread-making, the working of iron, and the impurities of water. In these as well as in other subjects the endeavor seems to have been made to introduce all of the most recent discoveries and advances which are suitable to an elementary treatise. Examples are the water-gas process, the liquefaction of the 'permanent' gases, the electrical furnace, celluloid, cocaine, and artificial alizarin.

About one-ninth of the volume is devoted to a description of some of the compounds of carbon. The relations between the principal classes of these bodies are pointed out, but no attempt is made to teach the structural formulae of the more complex compounds.

THE U.S. consul at Palermo, Mr. Philip Carroll, has forwarded to the state department a translation of a pamphlet issued by Prof. E. Albanese, president of the sanitary council of

The elements of chemistry. By IRA REMSEN. New York, Holt. 12°.

Palermo. In this pamphlet he says that typhoid and scarlet fevers, diphtheria, small-pox, and cholera seem to have made their abode in Italy. The country remains unprovided with sanitary laws; and the government, lacking etiological and hygienic knowledge, makes provision only when any disease appears, and nearly always in consonance with the impression of the moment, issuing confusing or conflicting decrees and unreasonable instructions, which are nearly always useless. Then the cholera has its sway, and cities are terror-stricken. The sanitary authorities of the kingdom, the superior sanitary council, the minister of the interior, prefects and mayors, frequently provide contradictory measures, issuing regulations of no efficacy in preventing the spread of infectious diseases. During the last twenty-six years, in which Italy has been free, the government has never occupied itself with public health. In Sicily, Napoletano, Puglie, and Abruzzo, animals dwell in the same rooms with the people who own them. The pamphlet of Professor Albanese clearly demonstrates that sanitary matters in Italy are about as bad as they can be, and that, unless remedies are soon applied, there is nothing in the list of epidemic diseases which may not be looked for in the near future. He recommends that the government should at once assemble a commission composed of the most eminent hygienists and practical physicians, with a view to projecting a re-organization of sanitary systems.

— No. v. of part iv. of the eleventh volume of the 'Memoirs of the American academy of arts and sciences' contains the first instalment of a 'catalogue of 130 polar stars for the epoch 1875.0.' The joint authors are Prof. William A. Rogers and Miss Anna Winlock; and to the latter the credit of the execution of the work, according to Professor Rogers's plans, is due. The computations involved are very laborious, and one must admire the zeal and patience with which Miss Winlock has carried them through. The catalogue is based upon all observations of the stars from 1860 to 1885, and therefore a large number of reductions to the epoch 1875.0 had to be performed. For polar stars these reductions are quite tedious, because terms of higher orders cannot be neglected. It was therefore decided to discuss the various methods of reduction, and to find out the limitations of the approximations employed. The star Groombridge 1119 was chosen for this purpose, it being one degree from the pole, and the computations are given *in extenso*. The conclusions reached as to the availability of the different methods cannot be explained here, but are of much interest to astronomers. The authors have

made a really valuable contribution to the literature of the subject. Among other things, the catalogue, when completed, will contain yearly ephemerides of all of its stars within three degrees of the pole, and data for the reduction of the different catalogues employed to the system of the *Astronomische Gesellschaft*.

— Dr Lombard has re-investigated the question as to whether or not the upward movement of the leg, when the patellar tendon under the knee is struck, is a reflex act. The main argument against its being so is that the act requires only .03 to .04 of a second, while the reflex act requires .11. The chief point in favor of its reflex origin is that the vigor of the reaction depends on the integrity and health of the spinal cord. The explanation that the phenomenon is direct muscle-effect, but that the spinal cord must send down a shower of reflexes or keep up a healthy tonus to have the act result, is very unsatisfactory. Dr. Lombard found that the act follows after the same interval, when the muscle is electrically stimulated or the tendon struck, but that the interval is much longer (four times as long) when a reflex contraction is excited by rubbing the skin. Hence it is argued that the phenomenon is a direct muscular stimulation, and occurs too quickly to be of a reflex nature. In one case an after-jerk, following at an interval that suggested a reflex origin, was recorded; but this compound nature of the response, though carefully looked for, was not again observed. The explanation of the relation of the knee-jerk to the spinal cord cannot yet be given.

— George Fleming, LL.D., principal veterinary surgeon of the British army, regards as untrue the generally accepted theory that small-pox in man, and cow-pox, are one and the same disease. One of the best authorities quoted in support of the theory was the late Mr. Ceely, who reported that he had succeeded in producing cow-pox by inoculating a cow with small-pox matter. Dr. Fleming believes that Mr. Ceely was misled in this experiment, and that what he really used was vaccine, and not the virus of small-pox. His experiment was subsequently repeated on twelve heifers by Dr. Klein under Mr. Ceely's supervision, and, though small-pox matter was inserted abundantly into the incisions, cow-pox was not developed in any of the animals. Similar experiments have been performed in France and Italy, and the results have all been the same as those in England. Dr. Fleming holds that all these experiments go to show that the two diseases are not identical, nor can cow-pox be produced by inoculation with small-pox virus.