new research. Through most of the book this is very well done, but the causes of climatic change through geologic time do not find adequate treatment. There is, for instance, a rather extensive presentation and commendation of the several hypotheses of a wandering pole, but almost no discussion of the influence of changing atmospheric composition and none of such factors as a possible reversal of the oceanic circulation or possible changes in solar radiation. The absence of a dynamic proof of polar wandering adequate to account for climatic change makes it seem to the reviewer the least supported of all the climatic hypotheses.

To sum up this volume in a sentence—it is in the broad and admirable treatment of the present processes of sedimentation and in the interpretations which they give to the older sedimentary rocks that the book will be found to have its unique value.

JOSEPH BARRELL

Some Fundamental Problems in Chemistry. By E. A. LETTS. New York, D. Van Nostrand Co. 1914. 15 × 22 cm. Pp. v + 235. Price $2.50.

In the preface the author says that one of his "chief ideas was to contrast certain ancient views, such as those of atoms and a primordial element or primordial elements in the shape of air, earth, fire, and water, together with the possibility of transformations of these latter into each other, with the modern conception of electrons and the discovery of changes, such as those which the radioactive elements experience, which amount in fact to a change of one so-called chemical element into others. . . ." It is perhaps a question whether many readers will agree with the author that these two modern discoveries prove that even in science history may repeat itself; but fortunately one may like the book without accepting the author's thesis.

The book consists of four chapters on the older chemistry and seven on the newer chemistry. Under older chemistry the subheads are: ancient theories regarding the nature of matter and more recent theories as to the nature of energy; the atomic theory and atomic weights; the periodic law. There is nothing especially interesting or novel about this portion of the book and it might well have been omitted, thus giving the author an opportunity to amplify the portion on the newer chemistry, which is very interesting.

The newer chemistry, as understood by the author, deals with the effects of electrical discharges on gases in high vacua, radioactivity, Lockyer's theory of inorganic evolution, and Arrhenius's views on the birth and death of worlds. This part is admirable though distinctly not critical. The author apparently accepts, without much reservation, all the transmutations which Ramsay has described.

With Plücker tubes as a starting-point the author discusses the production of cathode rays when the degree of exhaustion is increased, and the properties of these rays. From cathode rays he passes to canal rays and thence to Röntgen rays. After that come Becquerel rays and then the discovery of radium by the Curies. The properties of the α, β, and γ rays are discussed and then the decomposition products of radium. The facts in regard to the production of helium are followed by an account of Ramsay's experiments on the alleged formation of lithium, carbon and neon. The author does not point out, as he well might have done, that it would be in the interest of science for Ramsay either to accept Mme. Curie's work on lithium or to repeat it and show wherein the discrepancy occurs. The present state of things is distinctly not creditable, and Ramsay's unwillingness to meet the situation raised by Mme. Curie's work on the alleged production of lithium has caused Ramsay's work on the alleged production of carbon and neon to be received with much suspicion. The last chapter on radioactivity deals with J. J. Thomson's discussion of the periodic law on the basis of the electron theory.

The chapter on inorganic evolution may be summed up as follows: In the very hottest stars we find hydrogen, helium, asterium and doubtless other gases still unknown. At the next (lower) temperatures, we find these gases

becoming replaced by metals in the state in which they are observed in the laboratory, when the most powerful jar spark is employed. At a lower temperature, the gases disappear almost entirely, and the metals occur in the state produced by the electric arc. These changes are simply and sufficiently explained on the hypothesis of dissociation.

The final chapter on the birth and death of worlds is based on Arrhenius's book entitled "Worlds in the Making." Arrhenius takes up the questions of the creation and of the eventual destruction of the stars and of worlds like our own, and gives reasons for believing that both operations are simultaneously occurring in cosmos, or, so to speak, a "winding up" and a "running down" of the machinery of the universe; the two chief forces at work being the mechanical pressure of light, or simply the "radiation pressure," on the one hand, and gravitation on the other.

WILDER D. BANCROFT

PROPOSED INTERNATIONAL MAGNETIC AND ALLIED OBSERVATIONS DURING THE TOTAL SOLAR ECLIPSE OF AUGUST 21, 1914 (CIVIL DATE)

IN response to an appeal for simultaneous magnetic and allied observations during the coming total solar eclipse, cooperative work will be conducted at stations along the belt of totality in various countries and also at some outside stations.

The general scheme of work proposed by the Carnegie Department of Terrestrial Magnetism embraces the following:

1. Simultaneous magnetic observations of any or all of the elements according to the instruments at the observer's disposal, every minute from August 21, 1914, 10^h A.M. to 3^h P.M. Greenwich civil mean time, or from August 20, 22^h to August 21, 3^h Greenwich astronomical mean time.

(To insure the highest degree of accuracy, the observer should begin work early enough to have everything in complete readiness in proper time. See precautions taken in previous eclipse work as described in the journal *Terrestrial Magnetism*, Vol. V., page 146, and Vol. VII., page 16. *Past experience has shown it to be essential that the same observer make the readings throughout the entire interval.*)

2. At magnetic observatories, all necessary precautions should be taken to insure that the self-recording instruments will be in good operation not only during the proposed interval but also for some time before and after, and eye-readings should be taken in addition wherever it is possible and convenient. (*It is recommended that, in general, the magnetograph be run on the usual speed throughout the interval, and that, if a change in recording speed be made, every precaution possible be taken to guard against instrumental changes likely to affect the continuity of the base line.*)

3. Atmospheric-electric observations should be made to the extent possible with the observer's equipment and personnel at his disposal.

4. Meteorological observations in accordance with the observer's equipment should be made at convenient periods (as short as possible) throughout the interval. It is suggested that, at least, temperature be read every fifth minute (directly after the magnetic reading for that minute).

5. Observers in the belt of totality are requested to take the magnetic reading every thirty seconds during the interval, 10 minutes before and 10 minutes after the time of totality, and to read temperature also every thirty seconds, between the magnetic readings.

It is hoped that full reports will be forwarded as soon as possible for publication in the journal of *Terrestrial Magnetism and Atmospheric Electricity*.

L. A. BAUER

WASHINGTON,
June 23, 1914

SPECIAL ARTICLES

AMMONIFYING POWER OF SOIL-INHABITING FUNGI

A COMPARATIVELY large amount of work has been done on the power of soil bacteria to produce ammonia from the nitrogenous materials found in the soil, or from organic materials such as dried blood or cotton seed meal added