THE METRIC SYSTEM.

TO THE EDITOR OF SCIENCE: Is it not a little incongruous for American scientists and scientific journals to urge upon Congress the legalization of the metric system to the exclusion of the old, while SCIENCE prints, without comment and in a quasi-editorial way, an abstract of government researches in which all weights are in ounces?* Would you not be warranted in declining any contribution in which were not given at least the metric equivalents?

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[Men of science and scientific journals ought certainly to use the metric system when possible. The United States Department of Agriculture cannot, however, afford to lessen its usefulness and to awaken criticism by making such of its researches as are intended for the general public more technical or difficult to understand than is necessary. It is consequently not certain that the metric units should have been used in this work on metabolism so long as foods are sold by pounds and ounces. It is often useful to give the common equivalents of the metric system in order that the matter may be understood and to teach the equivalents, but it is not often desirable to give the metric equivalents of the common system. Nothing is gained in clearness for Anglo-Saxons, and, as far as missionary work goes, the long series of decimals naturally required to express ounces or feet in the metric system give it a cumbrous and forbidding aspect. ED.]

SCIENTIFIC LITERATURE.

The Formation of the Quaternary Deposits of Missouri. By JAMES E. TODD. Reports of the Missouri Geological Survey, Vol. X. [1896], pp. 113–217, with two maps, four section plates, five full-page illustrations, and five small figures in the text.

No detailed study of the Quaternary deposits of Missouri has ever been attempted, except in a few limited districts, but short references to them are scattered through all the reports of the several Geological Surveys which have, in the past, been instituted in the State. By a careful compilation of these fragmentary notes, supplemented by much personal observation, Professor Todd has collected a large body of valuable information on the later geological history of the northern portion of the state. His intimate knowledge of the general features of the Pleistocene formations as developed in other states, has enabled him to produce a very concise description, and his conclusions, in the main, seem to be fully warranted by the data given.

The Quaternary formations are classified into (1) the Bouldery Drift, (2) the Loess and Gray Loamy Clay, (3) Terrace Deposits, and (4) Alluvium.

In many respects the drift deposits of Missouri are remarkable. The till, or boulder clay, is found in the north-central portion of the State in considerable thickness, but thins thence in a southwardly direction, as also toward the Mississippi and Missouri rivers. Over a large portion of the state north of the Missouri river it is less than five feet in average thickness, "and over considerable areas consists of small, shallow, detached patches. Toward the margin of the drift it usually disappears, and gives place to sparsely scattered boulders of northern origin." There is a total absence of distinct moraines, drumlins, kames, eskers, 'kettle holes,' basins, knobs, and the other classes of irregularities of surface usually found in drift-covered regions. No buried forest beds have been reported, and but few striæ observed. Probably the most interesting part of Professor Todd's discussion of the drift proper is a description of the small driftless areas in Ralls, Pike, Lincoln and Saint Charles counties. They correspond to a similar driftless ridge studied by Leverett in Pike and Calhoun counties, in western Illinois.

The second great formation of the Quaternary deposits of Missouri is the Loess and Gray Loamy Clay. The two are considered merely as different phases of the same formation. This is shown to extend, in probable original continuity, over nearly the whole of the northern portion of the state, but to terminate southwardly at an irregular line, whose position seems to be controlled by the topography. It descends from about 950 feet above the sea, at

*Experiments upon metabolism, etc., March 26, 1897, pp. 493–496.

Kansas City, to 825 feet, at Pilot Grove, in Cooper county. Except in Lafayette, Pettis and adjoining counties, it is never far beyond the recognized limits of the drift sheet. Along the Missouri river, especially at and near Kansas City, two divisions of the *loess* are recognized. The 'higher loess' is that which has the widest extension, being found nearly everywhere in association with the drift sheet, while the 'lower loess' forms high terraces along the Missouri valley. It is the latter which has furnished most of the data concerning the *loess* which have heretofore been reported from Missouri.

Much valuable information is given of the trough of the Missouri river, and the question of its age relative to the epoch of glaciation of its vicinity is discussed in considerable detail; also, the preglacial and present valleys of the Mississippi river between Montrose and Keokuk, Iowa. The sections of the old and new gorges are especially finely executed.

In the discussion of the origin of the Missouri Pleistocene formations, the following leading problems are recognized: 1. Waterlaid character of the *loess* and gray loamy clay. 2. Great difference of level between similar deposits in Missouri and southern Illinois. 3. Vastness of gorges of the Missouri and Mississippi rivers. 4. Absence of drift in the lower Missouri. The Missouri *loess* deposits are referred to a fluvio-lacustrine origin. A barrier in the form of a rocky ridge is supposed to have formerly extended from the present divide between the Osage and Glasconade rivers, across the present course of the Missouri river, through Warren, Saint Charles, Pike and Ralls counties, to and connecting with a ridge in Pike county, Illinois. This barrier, by preventing free drainage toward the lowlands in southern Illinois, is supposed to have enabled the waters flowing away from the melting ice sheet to deposit the *loess* and loamy clay on the drift plain to the northwest of it, while a similar formation was being laid down at a much lower level in the country southeast of it.

In summing up the Quaternary history of Missouri, Chamberlin's classification of the Pleistocene formations is adopted. The major portion of the drift proper is referred to the Kansan epoch. The Aftonian interglacial epoch is scarcely represented in Missouri, but its effects may be recognized in slight valley erosion, particularly in the extreme northwestern part of the State. During the Iowan epoch the ice sheet is believed to have again advanced into territory now included in Missouri, but to a less distance than formerly. The *loess* is also referred to this epoch. The succeeding Toronto and Wisconsin epochs are inseparable in this state, but their effects consisted largely of increased depth of stream erosion.

The present writer desires to suggest that the idea that the distinctive deposit commonly known as *loess* was deposited by broad semi-lacustrine stream floods, originated from the study of flat areas where the formation was laid down as a nearly uniform sheet upon a plain. This hypothesis would not have originated upon certain other areas, for instance, the upper Mississippi region, where a *loess* of the same age as that of Missouri and nearly identical in the lithological features, mantles almost equally as uniformly, a characteristically hilly land surface. Here, undoubtedly, a purely lacustrine or possible semi-marine origin must be assumed for the waterlaid silt and loamy clay which covers hill-tops, slopes and broad flat valley-bottoms alike. It may be possible that the great difference in altitude between the *loess*-covered plain of southern Illinois and the much more elevated drift and *loess* plain of northern Missouri may be the result solely of the original altitudinal diversity of the preglacial land surface upon which they are superimposed. The supposed barrier from the Osage-Gasconade divide to the driftless ridge in Pike county, Illinois, would thus become unnecessary.

O. H. Hershey.

Angewandte Elektrochemie. Erster Band. Von Dr. Franz Peters. Hartleben's Verlag, Wien; Leipzig.

Electro-chemistry is one of the most recent subdivisions of chemical science. The study of its theoretical side has been most actively promoted and splendid results have been brought to light. Applied electro-chemistry is of even