mations of the existing continents. Mesozoic and Tertiary geology are treated in the same comprehensive way, in the endeavor to show the former relations of sea-level to the lands.

In the last chapter of this volume, Suess gives the principal points in his theory. "Once," he states, "that the marine depressions are regarded as sunken tracts, the continents acquire the character of horsts, and the pointed form directed towards the south, in the case of Africa, India and Greenland, is explained by the intersection of fields of sinking of which the principal domain is found in the south.

"The crust of the earth sinks; the sea follows it. But inasmuch as the sinkings of the lithosphere are limited in extent, the lowering of the surface of the sea affects the entire perimeter of the oceanic areas; it produces a general negative movement.

"The formation of sediments causes a positive uninterrupted eustatic displacement of the shore-lines." Other causes, such as variation in the quantity of water in the seas dependent upon the rate of formation of silicates and upon the variable action of volcanoes, give rise also to eustatic movements of the ocean. These changes with the movements of the ocean above noted form the outlines of his theory.

Suess appears to be placed in the necessity of minimizing the changes of level which many geologists have postulated in recent geologic time, for these supposed changes exceed the effects attributable to the operations which he invokes. Thus, to take but one example of evidence adduced in favor of profound alteration of level—that of the so-called submarine gorges of the Hudson, the Congo, and other rivers, Suess contends with Forel and others that these channels are the result of excavation and deposition now going on as in Lake Geneva. In this view such cañons are not criteria of change of level. To this criticism of the doctrine of extreme changes of recent level may be added that made by Davis upon the interpretation of fjords in high glaciated latitudes, that the ice has excavated the deep fjords and that their depth below sea level is not necessarily a measure of depression of the land (Proc. Boston Soc. Nat. His., Vol. XXIX. 227–322. 1900). So also the high terraces reported in the far north are not without close scrutiny to be taken as evidence of elevation since there are diverse kinds of terraces, some of them built in ice-confined waters far above sea-level.

It is understood that the venerable author of *Das Antlitz der Erde* has in preparation a concluding section of his great work. In that we may expect to find the discussion of many questions, which his singularly attractive hypothesis of a swinging, rising and falling ocean raises, in the light of the work of Lord Kelvin and other physico-geologists upon the rate of contraction of the earth and upon the apparent tilting of a continent with its Great Lakes, as in the case of North America.

The two volumes of the new French edition form perhaps the best summary extant of the geology of the globe and should find an English translator.

J. B. Woodworth.

Mesures électrique; essais laboratoire. By E. Vigneron and P. Letheule. Paris, Gauthier Villars. (No date.)

Resistance électrique et fluidité. By Gouré de Villemonteé, Paris. Gauthier-Villars. (No date.)

These two small octavo volumes, of one hundred and eighty and one hundred and eighty-seven pages respectively, are installments of the *Encyclopédie scientifique des aide-mémoire.*

The first contains a good discussion of the methods for measuring electric current, electromotive force, resistance, electrostatic capacity and self-induction.

The second is a very complete résumé of the experimental work that has been done in the attempt to discover the relationship between the electrical resistance of electrolytes and their viscosity.

Vigneron and Letheule devote eight introductory pages to *généralités sur les grandeurs.* They say that "une grandeur est dite mesurable quand on peut la comparer à une grandeur de même espèce et que le résultat de la comparaison donne à notre esprit une satisfaction complète." This statement is, indeed, somewhat

cleared up by subsequent statements given by the authors, but on the whole the introduction seems very unsatisfactory.

Length, angle, mass and time are called measurable quantities because these attributes (to speak of them briefly) may be divided into parts, which by means of one or another kind of congruence, are judged to be equal or like parts, and these parts may then be counted. This fundamental notion which is due, we believe, to Helmholtz, is no doubt the real basis of quantitative relations in physics; and it should be remembered that, although we frequently speak of the measurement of an electric current, of a magnetic field and what not, we never do actually measure anything but lengths, angles, masses and time intervals.

In the first chapter, on electrical units and quantities, Vigneron and Letheule make a distinction between *electromotive force* and *potential difference*, which distinction, being largely in vogue among electricians and not being based upon the fundamental conception of potential, it is a disservice to perpetuate. A distinction, however, there certainly is between the two, and it is, according to Maxwell, as follows:

When electric charge is transferred from one point to another work is usually done. The amount of work done depends in general upon the path along which the charge is carried. The work done in carrying unit charge along a given path is called the *electromotive force* along that path.

In special cases the electromotive force is the same along any two coterminus paths. In such a case the common value of the electromotive force is called the *potential difference* between the terminal points.

Now it seems to us that no author should attempt to make any other distinction between electromotive force and potential difference than the above. In particular the distinction between the *total electromotive* force of an electric generator and the *electromotive force between the terminals of the generator* should not be confused with the distinction between electromotive force and potential difference. One may answer, indeed, that the practical electrician is concerned with the distinction between *total* and *external* electromotive forces of electric generators, and not at all concerned with the fine distinction, according to Maxwell, between electromotive force and potential difference. This is too true, but this is no reason why electricians should be permitted to misuse these terms without protest, for very certainly the distinction between total and external electromotive force of a generator has nothing essentially in common with the distinction between electromotive force and potential difference in the sense in which Maxwell uses these terms.

There is one thing in which we know of only one person (Heaviside) who agrees with us, namely, that the notion of electric potential might best be dropped in the subject of electrodynamics, and we are convinced that the preference of most electricians for the term *potential* to the term *electromotive force* is in their tongues, not in their heads.

W. S. FRANKLIN.

BOOKS RECEIVED.

Text-book of Physiology. Edited by E. A. SCHÄFER. Edinburgh and London, Young J. Pentland. New York, The Macmillan Company. 1900. Vol. II., pp. xxiv + 1365. $10.00.

The Theory and Practice of Hygiene. J. LANE NOTTER and W. H. HORROCKS. Philadelphia, P. Blakiston's Sons & Co. 1900. Second Edition. Pp. xvii + 1085. $7.00.

A Treatise on Zoology. Edited by E. RAY LANKESTER. Part II., *The Porifera and Cœlentera.* E. A. MINCHIN, G. HERBERT FOWLER and GILBERT C. BOURNE. London, Adam and Charles Black. New York, The Macmillan Company. 1900. $5.50.

Free-hand Perspective. VICTOR T. WILSON. New York, John Wiley & Sons. London, Chapman & Hall, Limited. 1900. Pp. xii + 268. $2.50.

Dynamo Electric Machinery. SAMUEL SHELDON. New York, D. Van Nostrand Company. 1900. Pp. 281. $2.50.

Die Lehre von Skelet des Menschen. F. FRENKEL Jena, Gustav Fischer. 1900. Pp. vi + 176. M. 4.50.

Among the Mushrooms. ELLEN M. DALLAS and CAROLINE A. BURGEN. New York, Drexel Biddle. 1900. Pp. xi + 175.

The Principles of Mechanics. FREDERICK SLATE. New York and London, The Macmillan Company. 1900. Pp. x + 299.