

how the irregular shadows visible with low power telescopes have led up to the present network of lines seen through glasses of high power. J. J. Stevenson discusses 'University Control,' pleading for a reorganization of the present system and for a separation of educational and business management. 'The World-view of a Scientist: Ernst Haeckel's Philosophy,' by Frank Thilly, concludes that so far as philosophy is concerned Haeckel is still in his first childhood. M. C. Marsh treats of 'Eels and the Eel Question,' showing the many misapprehensions that have been held concerning these fishes and their reproduction. It is a pity that he did not round out the interesting article by telling what is actually known regarding their history. Theo. Gill gives 'The Story of a Word—Mammal,' showing that the etymology commonly given is incorrect and that it was coined by Linnaeus to denote that class of animals marked by having mammae. In 'A Year of Weather and Trade in the United States' R. DeC. Ward shows how intimately the two are connected. Frederick Adams Wood continues the discussion of 'Mental and Moral Heredity in Royalty' and there is a reprint of Sir Isaac Newton's 'A New Theory of Light and Colours.' In 'The Progress of Science' is an extremely good article on 'Science in American Journals' which makes plain the need of intelligent supervision of scientific articles of a popular character.

#### DISCUSSION AND CORRESPONDENCE.

##### 'EFFECTIVE FORCES.'

TO THE EDITOR OF SCIENCE: In a review of 'Some Recent Works on Mechanics,' in SCIENCE, October 11, 1901, reference is made to the use of the terms 'force of inertia' and 'effective forces' in two of the books under consideration, and the opinion is expressed that these terms 'are properly going, if not well nigh gone, out of fashion,' and that 'they seem doomed to be replaced by the more suggestive term "kinetic reaction," or "mass reaction."' It is to be feared that nothing is gained by argumentation upon questions of this kind, and I have no desire to revive a controversy which long ago occupied much space

in the pages of SCIENCE and elsewhere. But since the question has been raised in connection with my own use of the term 'effective forces,' I would be glad to record my reason for preferring this to the more modern and 'suggestive' terms favored by the reviewer. This reason is that it seems unwise to replace an established term by another unless the latter is a better description of the thing designated. And however imperfectly the term effective force describes the quantity to which it is applied, no term has been suggested which serves the purpose any better. 'Kinetic reaction' and 'mass reaction' are, indeed, suggestive, but it is for this very reason that they are objectionable, for they seem to suggest an erroneous conception of the third law of motion. In this respect they must, I think, be classed with the term 'force of inertia.'

May I add a word regarding the reviewer's remarks upon the theory of dimensions. He rightly emphasizes the value of this theory as a means of avoiding and of detecting errors in physical equations, but in citing a sentence from my book as an example of an erroneous interpretation of a constant which is immediately detected by the theory of dimensions he has, I think, been over hasty. The sentence quoted is strictly correct.

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August 19, 1902.

##### REFERENCE BOOKS IN NOMENCLATURE.

TO THE EDITOR OF SCIENCE: In the issue of SCIENCE for August 29, 1902 (p. 354), under the heading 'Scientific Nomenclature,' Mr. R. H. Harper gives a list of thirty-two words used in current scientific papers which he was not able to find in Webster's International (1890), the Century Dictionary (1902) or the Universal or Encyclopedic (1897). Being loath to believe that some of the words listed had wholly escaped the lexicographer reference was made to a 1901 edition of the Standard and to the Supplement of Webster's International (1900), resulting in the finding of definitions for thirteen of the terms. Eleven of these definitions are given after the

same form of the word as appears in Mr. Harper's list, while the other two are obviously identical in structure with forms given in the dictionaries. Thus *epeirogenic* becomes *epirogenic* while the *accultural* of the list has undoubted affinity with *acculturation* as defined in the works consulted.

Mr. Harper noted, however, that a few of his words were to be found in the dictionaries, but without meanings corresponding to their obvious application by the authors quoted. In three cases out of five, however, this objection has seemingly been met, at least, so far as can be determined without consulting the original references.

Peyote, also, does not seem to constitute a fair test for an English dictionary, as it is the native Mexican name for a cactus (*Ariocarpus fissuratus*) better known as 'mescal button' or 'dry whiskey.'

It would thus seem that success in reading with understanding the modern Carylean writers on scientific subjects depends in a measure, at least, on the reference books available.

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#### SHORTER ARTICLES.

##### THE PHYSIOLOGY OF SEA WATER.

For a number of years the writer has been studying the physiological action of various substances in simple and in mixed solutions. For two years the physiology of sea water has been given especial attention. A study of synthetic solutions variously prepared has seemed to indicate that such a solution when properly made is capable of replacing sea water in some instances in a very satisfactory way.

Experiments made at the Woods Hole Marine Biological Laboratory last summer by the writer and by Miss Susie Nichols, of Clinton, N. Y., working under the writer's direction, seemed to indicate that a synthetic solution prepared in such a manner as to contain the six chief substances present in the sea in the proportion there present, differed in a very marked way in its physiological properties from sea water. It seemed at the time that this difference disappeared to a large

degree when a considerable excess of salt over that given in analysis was added, and some structural differences in the molecular constitution of the two media were suggested as a possible explanation. A study of the conductivities and freezing points of the solutions concerned has been made under the writer's direction during the present season at the laboratory of the United States Fish Commission at Woods Hole by Dr. Joseph S. Chamberlain, expert in physiological chemistry of the Department of Agriculture. The evidence presented fails to sustain the experiments of a year ago. It is clearly indicated that through some error, perhaps due to insufficient allowance for water present in the salts used, a less quantity of salts was introduced than was supposed; hence the necessity for adding the supposed excess. In the correct concentration, Miss Nichols has been able to carry marine algæ for a large part of the year, in which time they have passed from spore stage to spore stage. It is a pleasant duty to state that, through the kindness of Professor A. D. Morrill, Miss Nichols has enjoyed laboratory facilities at Hamilton College for this work.

Experiments now in progress indicate that not only is it possible to prepare an artificial sea water in which certain marine algæ can develop, but it appears that many very sensitive marine animals can also be kept for longer or shorter periods of time, and often carry out a considerable part of their development in artificial mixtures.

Among animal forms that have been tested in this respect may be mentioned the following: The Ctenophore (*Mnemiopsis Leydii* L. Ag.), common in Woods Hole waters; *Gonionemus Murbachii* May., found in the eel pond at Woods Hole now being studied in this connection, I believe, by Dr. H. F. Perkins; a nudibranch mollusk which has apparently developed from the egg in an artificial medium; and the scup, stickleback and silver-sides among the fishes.

A further study of the subject both in its chemical and in its physiological phases is now in progress.

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