tions are not safe guides to interpretation of the intricacies of life in nature. McEwen's work in hydrography has even more strikingly shown the inadequacy of laboratory deductions. The success of all such studies has been largely due to following a program of operation.

Recently, Dr. O. T. Wilson, of the University of Cincinnati, arrived here with the statement that he was not committed to any special study and that he would like to do something to fit in with our work. As a result he is making some studies of floral successions on various kinds of surfaces in shallow waters with excellent results and with pleasure surely not to be surpassed by ignoring a general idea of plan in oceanic work.

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DEFINITIONS IN TEXT-BOOKS OF PHYSICS

I WISH to enter a protest, through your columns, against the continued use of two common expressions in text-books of physics, both of them true if properly interpreted, each of them capable of various interpretations and therefore inexact, unscientific and pedagogically wrong.

Year after year students tell us on the authority of text-books that "efficiency equals output over input," and year after year some of those students apply the idea to forces and confuse efficiency with mechanical advantage. "Output/input" is a form which lends itself to use in concise summaries of chapters on mechanics, but it is a stumbling-block in the path of just those careless or undiscriminating students who will most readily grasp that form of words in lieu of an idea. Such an expression as "output/input" means nothing in itself, because it might refer to anything, whether work, force, mass, volume or time; it means nothing unless it is defined, and if you must define it, why not use the definition directly? To be sure, it affords joy for a moment to the heart of a certain type of student, who, after struggling through a discussion of work as applied to machines till his brain is surrounded by a semi-luminous fog, turns over a page and suddenly sees a magic formula which he follows as a bright and shining light, a will-o'-the-wisp which lures him on to worse confusion than before.

The other practice to which I object is that of putting Newton's third law of motion into the form "Action = Reaction." What does it mean standing by itself on the page of an elementary text-book? It might refer to force, or to work, or to momentum, or even to that "action" whose leastness troubles the students of more advanced texts. Even the authors of the first book in which I ever saw a clear exposition of the third law of motion took pains to place before their own clear statement of the law the statement that Newton had put it in the form "Action is equal to reaction." Apparently even they, eminent physicists and understanding teachers as they are, felt obliged to pour out a libation to the shades of the original translators of Newton in the traditional way. My own experience in trying to teach with that book as a text has been that invariably some of the men who stood in greatest need of the clear statement were sure to learn the shorter and catchier statement which meant nothing to them. In some books the old form is the only formal statement of the law given, and, in spite of good illustrative explanations when they are given, it serves fairly effectually to prevent an understanding of the law as distinguished from an ability to parrot off a formula.

I am aware of the usefulness of very concise or semi-algebraic forms for gathering up and emphasizing the important points in a chapter, but there is also a grave danger of increasing the tendency of some students to fail to discriminate between a form of words as such and the real physical idea associated with it. This tendency is present even in the case of formulas and other very concise forms of statement which are perfectly accurate and definite, and is greatly aggravated in the presence of forms whose intended meaning does not necessarily follow from the words used. Two of the worst of the latter are those two which I have mentioned, and I should like to see them relegated by common consent to outer darkness, not afforded even the meager hospitality of a foot-note.

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