

should have acquired the accuracy of method which characterizes them. Kant says, That the scientific value of any branch of knowledge may be measured by the applicability of mathematical method to it. A similar statement of Comte's has been energetically combated by Huxley (*Scientific Aspects of Positivism—Lay Sermons, &c.*, p. 168); but there is this much truth in it, that the value of any science in mental training and in preparing the mind for future scientific research, can be so measured.

It is not so much the facts we want to impress on the student as the encouragement of a certain habit of thought. Haeckel says, "After all it is always the recognition of the effecting causes, not the mere knowledge of facts which satisfies the constant want of causalities of our mind. The recognition of common simple causes for the most various and complicated phenomena leads to the simplification as well as to the deepening of our education and culture; only by causal conception dead knowledge becomes living science. Not the quantity of empirical knowledge, but the quality of its causal conception is the true measure of the education of the mind." (Munich Address, 1877.)

That this is the sort of mental education which we wish to give, is only too evident from the deficiency in it which all of us experience more or less. The value of the more exact physical sciences in cultivating judgment is well advocated in a lecture of Faraday's, which in these days of hunting after the mysterious, everyone may still read with advantage. (Mental Education, a Lecture at the Royal Institution, 1854. *Researches in Chemistry and Physics*, p. 463.)

A careful study of Mathematics must of course precede any attempt to teach the Physical Sciences from this point of view, and side by side with that, drawing ought to have a most important place, which, if the old method of copying be now discarded is so valuable in training the eye and hand, and which I have found of great service while teaching with the microscope in helping my students to form clear and precise ideas of what they see.

The question may be asked how is the curiosity of the youth to be satisfied during this period of probation. You must have experienced that it is often too easily satisfied, but where it is not, there I should counsel that instead of hastening to the systematic study of Biology, the observation of plants and animals in their homes should be encouraged as much as possible, by putting attractive reading (such as the books of the Rev. Mr. Wood) in the way of the pupil.

It is a first essential, however, that the foundation should be such as will not afterwards require to be pulled down; and this brings me to the third point on which I propose to speak: The methods of the primary systematic teaching of Biology.

The introduction of this subject into the schools has flooded the market with text books and primers innumerable, and of very unequal merit. These are roughly divisible into two classes. Most of them, in pleasant and sometimes accurate language, attempt to convey a simplified general view of the facts and principles of the science in question. They, as it were, at-