

THE HIGH SCHOOL CURRICULUM IN SCIENCE.

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IT seems to be a pretty general opinion that, as a school subject, science has not fulfilled the expectations of her friends. The study of science in the schools has too often developed neither accuracy of observation nor clearness of thought—qualities which should confessedly receive from her their strongest and most enduring stimulus. In Great Britain the undertone of discontent has gradually risen into a true British growl, which has resulted in several things, *e.g.*, the appointment of a committee by the British Association for the Advancement of Science; the reading of papers before that body; and vigorous discussions of the whole subject of school curricula in elementary science. The general conclusion seems to be that these curricula cover too much ground and deal with a subject-matter too far removed from the pupils' possible or probable experience. In the early days of the natural and experimental sciences the range of investigation was still so narrow that there was little difficulty in selecting the fields most suitable for beginners. As a consequence, we find the elementary text books at such early periods dealing with familiar material, showing to students the scientific aspect of their every-day life. But, as facts accumulated, the temptation to take in a wider field became stronger, and in many cases led to an abuse which is still too common—the presentation of the sciences as collections of definitions and generalizations; in fact, they were, and are, taught as if deductive instead of inductive.

I propose in this paper to examine

some of our courses in science; and I shall in the first place state certain general principles which will, I think, be accepted without question. These are educational maxims, quite familiar to all who have made a study of educational methods. The natural method, and the only profitable method for immature, untrained minds is (1) from the known to the unknown; and (2) from the particular to the general. The application of these principles to the presentation of elementary science implies (1) That the subject-matter shall be familiar in the early stages, and gradually pass on to the unfamiliar; and (2) That facts shall be studied copiously and carefully before the explanatory theories are introduced or generalizations made.

How often have trembling tyros in science been brought without the slightest warning or preparation into the shadowy terrors of the protoplasmic or atomic presence! How many would-be followers of Faraday, Priestley, or Black have been abashed and confounded by a premature introduction to Dalton, Avogadro, or Mendel-eff! Many a promising latter-day Darwin has been nipped in the bud by an untimely blast from the evolution theory!

Perhaps the deadliest educational sin of this age, so far as the sciences are concerned, is that of presenting to students ready-made classifications, definitions, generalizations, and theories. It is obvious, I think, that students should, as far as possible, classify after, and not before, *voilà*, they have studied the things to be classified. I am inclined to think