

principle, the learner may be stimulated to deduce from it results which lie beyond the bounds of his experience. The subsequent verification of his deduction by experiment never fails to excite his interest and awaken his delight. The effects obtained in the class-room will be made the key to the explanation of natural phenomena,—of thunder and lightning, of rain and snow, of dew and hoar-frost, of winds and waves, of atmospheric refraction and reflection, of the rainbow and the mirage, of meteorites, of terrestrial magnetism, of the pleasure and buoyancy of water and of air. Thus the knowledge acquired by the study of experimental physics is, of itself, of the highest value, while the acquisition of that knowledge brings into healthful and vigorous play every faculty of the learner's mind. Not only are natural phenomena made the objects of intelligent observation, but they furnish material for them to wrestle with and overcome; the growth of intellectual strength being the sure concomitant of the enjoyment of intellectual victory. We do not entertain a doubt that the competent teacher who loves his subject and can sympathise with his pupils, will find in experimental physics a store of knowledge of the most fascinating kind, and an instrument of mental training of exceeding power.

ii. Chemistry is remarkable for the comprehensive character of the training which it affords. Not only does it exercise the memory and the reasoning powers, but it also teaches the student to gather by his own experiments and observations the facts upon which to reason.

It affords a corrective of each of the two extremes against which real educators of youth are constantly struggling. For on the one hand, it leads even sluggish or uncultivated minds from simple and interesting observations to general ideas and conclusions, and gives them a taste of intellectual enjoyment and a desire for learning. On the other hand, it checks over-confidence in mere reasoning, and shows the way in which valid extensions of our ideas grow out of a series of more and more rational and accurate observations of external nature.

It must not, however, be supposed that all so-called teaching of chemistry produces results of this kind. Young men do occasionally come up to public examinations with a literary acquaintance with special facts and even principles of chemistry, sufficient to enable them to describe those facts from some one point of view, and to enunciate the principles in fluent language, and yet who