

On Physical Science in Schools.

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[*Abstract.*]

Now that more science has become the popular educational cry, there is a danger of raising too great expectations of what physical science can do, and so of paving the way for a reaction against it when it is found not to yield the results unduly expected of it. This arises mainly from basing the claims of physical science to a school place upon an exaggerated estimate of the value of the *knowledge* imparted, and from not admitting it as an educative agent capable of filling a unique place in the educational course. On account of the popular belief in the ultimate practical, or bread-and-butter value of science teaching, it has been introduced in many cases as an attraction in a school prospectus without adequate means being provided for efficiently carrying it on. In such cases it often takes the form of the popular lecture illustrated by experiments which requires no great mental application on the pupil's part, gives him amusement, and relieves him for the time from some of his dry daily routine, but which fills him at the same time with a false and mischievous notion of what science is. It is of great importance that the true place and aim of physical science in schools should be clearly recognised, not merely by scientific men and educationists, but also by the intelligent general public, for it is only when such recognition is general that the means of equipping and maintaining science work will be forthcoming.

The Science and Art Department by means of its grants in aid has done a great deal to introduce and extend science teaching, and School Boards find the temptation of earning grants so strong that they readily equip their common schools with the needful apparatus and staff for this work, while they leave their secondary schools most scantily provided in both these respects, the science work usually being thrown on the shoulders of the already well-loaded mathematical masters. While we all acknowledge the evils of any teaching undertaken for examination purposes or for earning grants, yet such science teaching has done good, and though not the best, it is better to have it than to have no science instruction at all.

Whenever science teaching is lifted out of the degrading position of being a mere attraction in a school prospectus, and is acknowledged as an important factor in true education with a special bearing on

the problems of life, then will due provision be made for it in suitable rooms properly furnished and supplied with apparatus. Teachers will be engaged with special reference to this work, and proper time will be allowed them for preparation, with qualified assistance where needed. Then also, and this is of considerable importance, the progress of the pupils in this department will be duly recognised, and take a place in the honours of the school.

“When scientific physics have as recognised a place in public instruction as Latin and Greek they will be as well taught.” (M. Arnold).

The first physical science subject requiring a lift out of its present position is physical geography or, more generally, physiography. This subject, the first branch of physical science the pupil is introduced to, is commonly left to the English teacher to be taken up or not as he can find time for it amid the multiplicity of things he has to teach, and in that case receives very inadequate treatment. It ought, instead of being hustled in among a crowd of other claimants on the teacher's time, to be specially provided for in the time-table under a science master, and furnished with suitable appliances, especially physical maps and diagrams, the best procurable.

Chemistry is taught usually both theoretically and practically, and physics theoretically only. Practical physics is either not attempted at all, or as a rule not well done. Physical laboratory work is looked upon as unsuitable, taking the form of “qualitative experiments only leading to play,” or of “measurements involving the use of costly instruments and taking too long time.” In an excellent book on practical physics, by A. M. Worthington, it is shown how without any very costly instruments or furnishings a most interesting and useful course of experiments can be given to classes of even young boys. It accustoms them to the use of their hands, and to take observations with common instruments, giving them a training in exact methods of the highest value. It is a kind of training most suitable for boys, a training which, when left to a later period, disgusts many students of University physical laboratories, who cannot be entrusted with higher work for the want of such a preliminary training. The extension of such classes is greatly to be desired for the sake of pupils who may be looking forward to any kind of physical work, and for the sake of relieving the University laboratories of a great amount of the elementary work which is their reproach.