

The final sitting was held on Friday morning, January 11, when papers were read by Mr. T. Strangeways, on a description of an infectious disease occurring in hares; by Mr. E. G. Farnsides, on the blood changes in man caused by the presence of metazoan parasites, and their aid in diagnosis; and the use of an economic museum in the teaching of geography, by Mr. W. G. Freeman. Some valuable observations were brought out in Mr. Farnsides' paper on the changes observed in the blood in parasitic attacks and the production of toxins by the parasites. Mr. Warburton exhibited an apparatus for extracting small mites, &c., from moss, invented by Prof. Berlese, who contributed a paper on the olive-fruit fly and its treatment.

The next annual meeting will take place at Edinburgh in Easter, 1908; a meeting was also arranged for July in London.

Mr. Walter Collinge, of Birmingham University, is still continuing the secretaryship.

THE PUBLIC SCHOOL SCIENCE MASTERS' ASSOCIATION.

THE annual meeting of the Public School Science Masters' Association was held on Saturday, January 12, at the University of London, the president, the Rev. and Hon. E. Lyttelton, headmaster of Eton, being in the chair.

The president, in his address on the place of science and of literature in a general education, prefaced his remarks with the opinion that a classical headmaster had one great advantage when criticising a science lesson in that his total ignorance of the subject placed him in the position of the most backward of pupils, and enabled him to ascertain exactly when the lesson was successful in producing the required impression on the mind of the learner. In the discussion of educational matters there were the dangers of cloudiness from ignorance and of dogmatism which afforded no contribution to the discussion. Science was calculated to diminish these two dangers. By science he meant experimental study, and not the form of class demonstration sometimes, in the old days, combined with lax discipline, the object apparently being to provide a sort of agreeable change in the regular work of the schoolboy.

As now understood, general education meant that given to boys up to the age of sixteen, and the arguments following were in favour of science being taken seriously before that age. It would be conceded that science aroused more interest, at least in its initial stages, than was the case with any other subject, save religion, but it was a question whether this interest did not fall off later when more brain work was required. This was so with classics. The practical question, however, was not whether science interested the boy more than did the classics, but whether science and literature should go on together. The boys who were apparent failures at classics might be found successful later in science. Huxley had said that in science young minds were brought into contact with facts. It was not so very different in the case of literature. The advantages claimed for science in educational effects, training in inductive and deductive methods, and freedom from following mere authority, were shared by most other subjects when these were taught by modern methods. These newer methods were certainly due to the influence of science teaching.

The advantages of experimental science might be said to consist in the constant application to reason, truth, the senses of touch and sight, the virtue of patience, and accuracy. Science brought the pupil into association with the great army of discoverers, and illuminated daily life with its stimulating powers, leading to the exercise of the precious faculties of imagination and wonder. The president pleaded for training leading to ambidexterity, and referred to the healthful mental effect afforded by exercise of both sides of the brain, pointing out that many school games were lacking in this respect. The results of scientific and of literary teaching both depended upon the

enthusiasm of the teacher, but this was especially true of the latter. One advantage of literature was that it brought the learner more into contact with human affairs generally, and although some of the faculties touched were the same as in the case of science, there were others not so influenced. They were not called upon to decide between two subjects. There was room for both; teachers of science and of classics should be co-workers. Literary teachers should be able to save the science masters the labour of teaching the art of making notes in correct style. The classical failures should be rescued by science. The classical teacher called to the science teacher for help with new devices to touch the imagination and awaken hope—for something to haunt, startle, or waylay the young minds; to make them feel the joy of learning.

Sir Oliver Lodge said that to eliminate the heat retained rather than generated by cloudiness of thought and fog of dogmatism, it was necessary to admit the clear and bracing atmosphere of science. He agreed that ambidexterity was to be encouraged. There were three kinds of boys, the docile, the eager, and the unwilling, each of whom required different treatment. But it was necessary to consider the average boy. The quantitative side of science should not be overdone. In that respect subjects differed; in the study of heat, quantitative work was desirable in the earliest stages, but in electricity he thought it better at first to allow an acquaintance with phenomena, proceeding later to measurement. The teacher should excite interest, rouse curiosity, feed only the hungry, and not stuff with information *apropos* of nothing. Sir Oliver suggested that astronomy and physiology might be taken in schools, and that astronomy should be treated in a manner not too technical, but rather on biographical lines. One should begin at both ends of a subject, but in different ways, for science was both inductive and deductive, and this method of learning would use both qualities. He advocated the pupil's going "behind the scenes"; he should read examination answers, perhaps set examination papers. In learning a language a boy was apt to consider he was dealing with chaos, so many forms of words occurring, e.g. changes in stem of verbs, for which he could see no reason. Were the boy set to construct a language, he would see the necessity for and realise the meaning of tenses and cases. Boys should be encouraged to read the classics of science, and then they would get to appreciate the spirit of scientific investigation, which should be carried into all their studies. Books should be used in order to learn how to acquire knowledge at first hand; problems should be thought out before information was gratuitously supplied. A literary education was possibly best on the psychical side, but it did not give a knowledge of the material universe, and no educated person should be deprived of this.

Prof. Tilden thought the system of classical and scientific sides in schools was insufficient. There were, for instance, artistic minds which did not respond to either of these divisions. The president, replying to Mr. J. Talbot (Harrow), said he agreed that science should have a liberal allowance of time in the curriculum, something quite different from simply two hours per week, and in reply to the Rev. A. L. Cortie, S.J. (Stonyhurst), he advocated commencing the subject at, say, six or seven years of age. Mr. Thwaites (Wyggeston Schools, Leicester) gave the results of some inquiries he had made of the chief public schools. In general, about 60 per cent. of the boys take science, and of these about 95 per cent. are in the general courses. The average number in classes was 21.5 for the general and 14 for special courses. The former were allowed, on the average, four hours per week for two subjects, and the latter twelve hours. In twenty-three schools there was one science master for every seventy-six boys. He considered it was now time for the schools to agree upon the subject-matter of their science courses.

Mr. F. R. Leyland-Wilson (Charterhouse) read a paper on the best method of introducing the atomic theory in science.

An exhibition of apparatus by members and manufacturers was held at the close of the meeting.