Annual Meeting of the Science Masters' Association.

THE thirty-second annual meeting of the Science Masters' Association was held in the Imperial College of Science, London, on Dec. 29–Jan. 1, with evening meetings in the hall of King's College for Household and Social Science. The trade exhibition of apparatus and books, and also the exhibition of apparatus and experiments by the members themselves, was the largest in the history of the Association.

In the course of his presidential address, Dr. Cyril Norwood, headmaster of Harrow School, pointed out that modern science has produced an upheaval in man's intellectual and spiritual outlook comparable to that produced by the Renaissance, and, in its material aspects, has led to a rapidly increasing mechanisation of modern life. The one effective shield against this mechanisation will be found in a remodelling of our system of education, so that it will satisfy the creative instinct of the child to do and to make, and also develop his faculty of æsthetic appreciation.

The Renaissance produced a system of education, culminating in the universities, which has persisted until recently, despite the fact that only one-tenth of the secondary school population now proceeds to the universities. The object of the older type of education was to produce specialists and to train for the professions, but in future the schools must aim at becoming training grounds for democracy. Whereas in the past the schools produced the great individual, they must now aim at the wider task of producing the great community, and our educational system must be remodelled to that end. This requires the freeing of the school certificate from the demands of university entrance.

An elementary study of any subject should result, in average pupils, in the acquirement of a sense of fact and a sense of law. Dr. Norwood stated that there is nothing better for this purpose than the study of elementary science, which is admirable for training the mind in the power of discovering facts and reasoning from them, and, properly taught, should result in a clear grasp of the difference between fact and opinion, which difference, even as in Plato's time, is not apparent to the majority of people. Dr. Norwood recommended the *universal* teaching of science as a necessary part of a preparation for citizenship. He suggested a course in chemistry, physics, and biology, with excursions into geography, geology, and astronomy, which should include simple elementary nature study and exact and simple measurement. Such a course would open a lot of windows in the mind of the pupil.

In welcoming the Association to the Imperial College, the rector, Mr. H. T. Tizard, stated that the scientific equipment and also the general education of boys has improved beyond all bounds during the last few years. This period has seen the disappearance of both the dogmatism of the scientific man and the arrogance of the classicist. Mr. Tizard is a great believer in general science as a subject for the school curriculum. The difficulty is that scientific men have not yet been able to agree upon the lines this should take, and he urged that the solution of this problem should be the most important work of the Association in the near future. He hoped that they would produce a scheme which would appeal to intelligent laymen.

Prof. Jocelyn Thorpe, in his address on "The Schools and Research", directed attention to the great work which has been accomplished by such men as Shenstone, H. B. Baker, Francis Jones, R. L. Taylor, and Tilden, all of whom commenced their researches as science masters in schools. If a science master can find time to do research in his school, it is bound to have a stimulating effect on his pupils. He invited attention specially to the advances made in biochemistry during the last few years, which have resulted in the isolation of definite organic compounds controlling the processes of life. Some of these are introduced into the body by the food we eat, others are manufactured in the body itself, but all are essential to life and health. Sometime in the future, much ill-health and disease will be eliminated by the administration of the required organic substance in the quantity necessary to correct the maladjustment. Prof. Thorpe went on to discuss the importance of hormones and vitamins, and he showed specimens of the anti-scorbutic vitamin E, which has only recently been isolated from orange juice. Calciferol (vitamin D) has also been isolated after twelve years of patient research.

Dr. G. C. Simpson addressed the Association on "Modern Weather Forecasting", in the course of which he gave a most lucid account of the mechanism which produces a 'warm front' and a 'cold front'.

On New Year's eve, Prof. E. W. MacBride's lecture on "The Inheritance of Acquired Characters" provoked a stimulating discussion, which was continued in the Common Room, until the approach of midnight reminded Prof. MacBride that he had promised to attend a New Year party.

The Television Society arranged a most valuable lecture-demonstration, in which experiments, many suitable for school use, were shown. Mr. J. J. Denton, honorary secretary of the Television Society, lectured, and the experiments were shown by Capt. R. Wilson, Mr. A. A. Waters, and Mr. R. W. Corkling.

In the trade exhibition, the exhibit of colour photography, given by the Finlay Photographic Processes, Ltd., is worthy of special notice. The most interesting feature illustrated the application of the Finlay colour process in the teaching of biology. Eighty-one lantern slides were exhibited to illustrate a first year's course in biology, the zoological subjects having been selected by Prof. E. W. MacBride, and the botanical subjects by Mr. J. S. Gilmour, assistant director at the Royal Botanic Gardens, Kew. Many of the slides are micrographic, the colour is remarkably accurate, and there is no doubt that the utility of these slides for teaching purposes is greatly enhanced by their being in colour. We understand that if the company meets with sufficient encouragement in its effort to furnish accurate colour slides of this description, a further series of scientific subjects will be prepared. The process itself is one that can be worked quite easily by the amateur with any size and make of plate camera. Apart from the fact that it is an entirely British process, it has certain definite advantages over any other known method of colour photography. It gives a brilliant result with a single exposure at a very high speed, and it is capable of unlimited duplication. Many of the outdoor scenes shown were taken with an aperture of 4·5 at speeds which varied from one-fiftieth to one-half of a second. It can be applied, therefore, to subjects involving movement or stay of movement.

In the members' exhibition, Mr. E. G. Savage gave fascinating demonstrations of experiments on colour. These were described in detail in the *School Science Review* for October and December 1931. Mr. F. A. Meier, of Rugby School, exhibited a remarkable selection of apparatus made in the Rugby School

workshops. His ingenious devices are worth an article in themselves. We were greatly impressed by his method of doing Kundt's experiment, using a brass tube with two thick circular plates of brass soldered at nodes a quarter of the length of the tube from each end; these plates fit between two blocks of wood on a rigid stand. The cork at one end of the brass tube is stuck on by resin, so as not to constrain the vibration of the tube, and the resonance tube of glass contains no visible lycopodium until the note is obtained, when the nodes are evident as very fine lines, the position of which can be read to 0·02 cm. by a travelling microscope. Mr. Meier said that a few degrees difference in temperature, such as results from turning out a gas fire in the room, produces a measurable displacement of the nodes.

The retiring chairman of the Association, Mr. W. H. Barrett, of Harrow School, handled the annual business meeting with skill. A resolution was passed assuring the president that the Association would support him in any steps he may take to initiate a reform of our educational system on the lines laid down in the course of his presidential address.

The next meeting of the Association is to be held at the University of Bristol, on Jan. 3–5, 1933, and the new president will be Prof. A. M. Tyndall. E. N.

Form and Height of Clouds.

THE Central Meteorological Observatory at Tokyo has recently published an illustrated account of a thorough photometric study of clouds made at the Meteorological Observatory at Mera. Mera lies at the southern extremity of the Bôsô peninsula, in the south-east of Japan proper, at no great distance from Tokyo. The observations cover the period of two years ending on Mar. 31, 1929, and were made by three members of the staff of the Mera Observatory.

Although the work does not appear to have been undertaken with the solution of any particular problem in view, and might be adversely criticised on the ground that we have already too many such bulky statistical compilations relating to the weather of temperate latitudes, such criticism should be qualified in view of the fact that the information about the heights of various forms of cloud in this work is rarely based on measurements of single points in the cloud, but on so many points that an idea is given of the vertical extent of the cloud as well as of its height above the ground. For example, a photograph numbered 217 in the section devoted to stratocumulus clouds, portrays a group of these clouds and alongside a key diagram with numbered points. In a table underneath, the measured heights of these points are shown. One of the larger fragments of cloud contains five such points, and the table shows that the lowest height was 1489 metres and the highest 1587 metres, whence we deduce a minimum of 89 metres for the vertical extent of this particular cloud. The table further informs us that the mean height of the whole group was 1534 metres and the range 117 metres.

The heights were obtained by two photo-theodolites of German manufacture set up at the ends of a base line 1161 metres in length—a length that should ensure a fair degree of accuracy even in the measurement of cirrus clouds, which normally occur at heights equal to about seven times the length of the base line.

There is another aspect of the work which calls for favourable criticism, and that is that the quality of the photographs and the complete range of form illustrated justifies the authors in describing section viii. as a "Cloud Atlas". It is an atlas in which the full information about the heights of the clouds just described is supplemented by figures giving the mean amount of cloud on each occasion, its speed and direction of movement, and the speed and direction of the wind near the ground. When telephotographic representations of cloud are given and no terrestrial object appears in the field of view, the reader is likely to have a difficulty in imagining the true appearance of the clouds, unless some device is adopted for giving the scale of the photograph. In this event, a circular line might with advantage have been added in one corner of each photograph, the diameter of the circle being equivalent to about half a degree, that is, to about the diameter of the sun or moon, so that the clouds could be compared with either of these luminaries.

It should be noted that in addition to the section described as a cloud atlas, there are numerous tables relating to the heights of the different clouds, and the seasonal variations of these are shown by graphs, as well as being given in tabular form.

E. V. N.

Photocells: the Valves which operate by Light.*

ONCE the potentialities of devices in which the action of light produces or changes the magnitude of an electric current are properly appreciated, they are likely to become very widely employed. At least four types of these are now available: the selenium cell and its congeners, the alkali metal cell —operating on the external photoelectric effect, and often called a photoelectric cell to the exclusion of the others—the electrolytic cell, and the dry plate rectifier cell. Of these, the electrolytic cell, in which the electromotive force is changed when the electrodes are exposed to light, is as yet little understood, although it is likely to be of value for some purposes. More attention is being paid to the rectifier cell, which is the development of a crystal rectifier which has been found recently to be sensitive to light and is going to be very important. Selenium cells employ a half conductor of a similar type to the crystal, but work simply by its change in resistance when illuminated, Ohm's law being obeyed, which is not true of rectifiers.

Choice of cell for any particular purpose depends upon exactly what is required of it, but the answer that an engineer wants in most of the less complicated industrial applications can be illustrated by performing an experiment, in which the current through an incandescent lamp is altered until it produces a current of a few microamperes in the circuits of various cells exposed to its light. Selenium cells are found in this way to be the most sensitive, then electrolytic cells, gas-filled alkali cells, and rectifier cells, and the vacuum alkali cells come last. On the other hand, vacuum alkali cells give a response proportional to the intensity of the light, provided its colour is not altered, and have the great advantage of having an effectively instantaneous response, whereas the response of the selenium cells bears a less simple relation to the intensity of the light and may not reach a

* Substance of a lecture-demonstration given by Mr. C. C. Paterson on Jan. 5 at the Physical and Optical Societies' Annual Exhibition of Scientific Instruments and Apparatus at the Imperial College of Science, South Kensington.