THE MANCHESTER WHITWORTH INSTITUTE.

THE inaugural proceedings in connection with the formal organization and constitution of the Manchester Whitworth Institute took place on Thursday last, July 17. Among those present were Lord Hartington, Sir F. Leighton, Sir Joseph C. Lee, Sir J. J. Harwood, Mr. W. Mather, M.P., Sir Henry Roscoe, M.P., Mr. O. Heywood, and many representatives of educational institutions in the city.

The governors first held their inaugural gathering in the building which is to form part of the museum, and which stands in one corner of the park. Afterwards, a meeting was held in a tent in the park. At this meeting Lord Hartington said that, although he had not been aware that he would be called upon to address them before the evening proceedings, he was pleased to move a resolution which acknowledged the wise benevolence and generosity of the legatees of Sir Joseph Whitworth, and commended the Institute to the support of the public as subscribers and donors of works of art and books, and to the community of Manchester for a contribution from its municipal funds for maintenance. He described the new departure taken that day as of a very important and possibly momentous character—probably the most important and ambitious step which had been taken yet in the direction of the movement of technical and scientific instruction and art education. That undertaking was the embodiment of a great idea, and the charter of the institution appeared to have embodied the ancient idea of a University, under which various colleges independent of one another agreed to co-operate in a common management and government, while retaining a considerable independence for a common end and a common good. In one respect, however, the ancient course seemed to have been reversed, for the University was prepared to support the colleges, which were the technical and art schools, instead of the colleges supporting the University, as of old. In conclusion, he expressed a hope that the example of the Whitworth legatees would lead others, and especially the Corporation, to assist and promote the useful objects of the Institute.

The proceedings connected with the opening of the Institute were continued in the evening, when the Mayor entertained a distinguished company at a banquet in the Town Hall. The loyal toasts having been honoured,

The Mayor proposed the residuary legatees of the late Sir Joseph Whitworth.

Chancellor Christie, in responding, said it was the earnest desire of the late Sir Joseph Whitworth that his fortune should be employed in promoting the cause of education, and especially of science and art education. He desired that there should be a graduated system of schools and colleges, by which a deserving lad might rise from the lowest elementary school to the highest institutions for the teaching of science, literature, or art. How best to accomplish this exercised Sir Joseph Whitworth for many years, but he was never able to perfect a scheme. That work he left to his legatees, and they had already spent over £300,000 in carrying out what they believed to be his ideas, while other liabilities still remained.

Mr. Alderman Thompson proposed "Success to the Whitworth Institute."

The Marquis of Hartington, in responding, said that his connection with the question of technical education was an extremely slight and superficial one. He did not pretend to be an expert on the matter, and he had only taken it up because he had been struck with the fact that every other country in Europe gave more time and money to the promotion of technical education in some form or another than did the English nation. This state of things was coincident with complaints of the great severity of the commercial and industrial competition to which we were exposed. He could not help asking himself whether there was any connection between our neglect of technical education and the increased severity of the competition to which we were exposed. Then there was another question. Suppose the severity of the commercial competition were due to other causes, were we giving ourselves every chance in neglecting the technical education of our industrial population? He thought it was scarcely possible to exaggerate the importance of this question. To us the maintenance of our place in the race of commercial and industrial competition was not a question of greater or less prosperity at any particular moment; it was not a question of being leader or follower in the world's civilization; it was for many millions of our population a question of actual existence. If, through any circumstances, we ceased to be the greatest producers of the necessaries the world required; if, through any circumstances, we ceased to be the greatest distributors of the wealth of the world, not only would these small islands cease to be the seat of a great empire, but their limited extent would fail to produce the materials of bare existence for millions of people whom our industrial supremacy alone had brought together and enabled to exist here. We had received from our predecessors a great inheritance—the commercial and industrial leadership of the world. Up to the present time that inheritance had not shrunk or dwindled. Our pre-eminence had been largely due to the natural advantages we had enjoyed, but we knew that the conditions of supremacy, such as we had hitherto enjoyed were not always permanent. History taught us that in ancient times Greece and her colonies, and in modern times Italy and Holland, enjoyed that commercial supremacy which had more lately been ours. That supremacy had passed away from those countries under the changing conditions of commercial and industrial enterprise in Europe, and it would be rash to predict that our natural advantages, to which we owed so much, were sure to continue. It would be impossible for human foresight to make adequate protection against what might happen, but it must be a great advantage to any nation when the leaders and captains of its industries and commercial pursuits were able to avail themselves of the most complete scientific education which it was possible to give. It was such considerations as these that had induced him upon more than one occasion to call the attention of his fellow-countrymen to the importance of this question. He could not pretend to do more. How these things were to be attained he left to experts to say. We might have long to wait before, by the action of the State, any measures would be taken which we might hope would place us on a footing as regarded technical and scientific education with other European nations, and it therefore gave him the greatest satisfaction to see that localities where the need was more especially felt had themselves taken the initiative, and had founded institutions for the purpose of making some advance in that which had been considered to be the business of the State in other countries. There was one feature of the present time which was calculated to give cause for just and legitimate satisfaction. He alluded to what he thought he saw in the growth of local public spirit. Such a spirit had never been altogether wanting among us. That it existed formerly among us was abundantly proved by the munificent foundations for religious, educational, and charitable purposes which our forefathers had handed down. There was a time when there was a tendency for even these ancient foundations to lapse into lethargy, and mismanagement began to prevail, but all that had begun to change, and now we had not only been occupied in reforming the abuses of those old foundations and institutions, so as to make them fully available for the new and growing wants of the people, but there had been shown to exist at the present time to as great an extent as formerly a disposition on the part of individuals who had acquired wealth in certain localities to use that wealth not for any selfish or personal purpose, but for the benefit and advantage of that population in the midst of which they had lived. He doubted not that the example which had been set by men like Sir Joseph Whitworth would be largely followed.

Sir Frederick Leighton also responded.

WEIGHTS, MEASURES, AND FORMULÆ USED IN PHOTOGRAPHY.

THE Photographic Convention of the United Kingdom, at a meeting held in the Town Hall, Chester, on June 26, considered the Report of a Committee which had been appointed to consider the weights, measures, and formulæ used in photography. The Committee consisted of W. Bedford, C. H Bothamley (Secretary), A. Cowan, A. Haddon, A. Levy, A Pringle, and G. Watmough Webster. The Report was drawn up by C. H. Bothamley. The following recommendations were unanimously adopted by the Convention:—

A. *Weights and Measures.*—(1) If the metric system be used, weights will naturally be expressed in grammes and measures in cubic centimetres.

(2) If the English units be used, the minim and the drachm should not be employed at all. All weights should be expressed either in grains or decimal parts of a grain, or in ounces and fractions of an ounce; all measures in fluid grains, or in fluid ounces and fractions of a fluid ounce.

B. *Formulæ.*—(3) Formulæ should give the number of *parts* of the constituents, by weight or measure, to be contained in some definite number of *parts, by measure,* of the solution. The mixture can then be made up with (*a*) grammes and cubic centimetres, or (*b*) grains and fluid grains, or (*c*) ounces and fluid ounces, according to the unit selected.

(4) The standard temperature for making up solutions should be 15° C. or 62° F. No appreciable error will be introduced by the fact that these two temperatures are not quite identical.

(5) Formulæ should give the quantities of the constituents to be contained in x parts of the finished solution, and not the quantities to be dissolved in x parts of the solvent. When a solid dissolves in a liquid, or when two liquids are mixed, the volume of the solution or mixture is, as a rule, not equal to the sum of the volumes of its constituents. The expansion or contraction varies with the nature of the solids and liquids and the proportions in which they are brought together. In making up a solution, therefore, the constituents should first be dissolved in a quantity of the solvent smaller than the required volume of the finished mixture, and after solution is complete, the liquid, cooled if necessary to the ordinary temperature, is made up to the specified volume by addition of a further quantity of the solvent.

(6) It is very important to specify, in the case of liquids, whether parts by weight or parts by measure are intended. The equivalence between weight and measure only holds good in the case of water and liquids of the same specific gravity: a fluid ounce of ammonia solution or of ether weighs less than an ounce; a fluid ounce of strong sulphuric acid weighs nearly two ounces.

(7) Whenever possible, formulæ should give the quantities of the constituents required to make up 10, 100, or 1000 parts of the solution.

(8) When a mixture (*e.g.* a developer) is to be prepared just before use from two or more separate solutions, it is desirable that the proportions in which the separate solutions have to be mixed should be as simple as possible—*e.g.* 1 to 1, 1 to 2, 1 to 3, 1 to 10.

(9) When metric units are employed, the original French spelling, "gramme," should be used in preference to the contracted spelling, "gram," in order to avoid misreading and misprinting as "grain."

SCIENTIFIC SERIALS.

IN the *Journal of Botany* for June and July we find contributions to systematic and descriptive botany by Mr. E. G. Baker, on new plants from the Andes, and on the genera and species of Malveæ; by Mr. F. N. Williams, a synopsis of the genus *Tunica* of Caryophyllaceæ, and others.—Mr. A. Fryer records what he believes to be an example of hybridity in *Potamogeton.*—Mr. H. T. Soppitt describes a new parasitic fungus, *Puccinia digraphidis*, the teleutospore-form of which occurs on *Phalaris arundinacea*, while the æcidio-form is parasitic on *Convallaria majalis.*

THE original papers in the *Nuovo Giornale Botanico Italiano* for July all refer to the geographical distribution of Italian plants, chiefly Hepaticæ and Fungi. Among the papers read at the meetings of the Italian Botanical Society the following are of special interest:—Signor O. Kruch contributes to our knowledge of the foliar fibrovascular bundles of *Isoetes.*—The exhaustive researches of Prof. Arcangeli on the structure of the various organs in the Nymphæaceæ are represented by an account of the leaves of *Nymphæa* and *Nuphar.*—Signor U. Martelli gives a very interesting account of the dissociation of a lichen (*Lecanora subfusca*) into its constituent algal and fungal elements, the complement of Stahl and Bonnier's observations on the synthesis of lichens.—Prof. Arcangeli describes the carnivorous habits of an Aroid, *Helicodiceros muscivorus.*

American Journal of Science, July, 1890.—The inconsistencies of utilitarianism as the exclusive theory of organic evolution, by Rev. John T. Gulick. The author criticizes various conclusions arrived at by Mr. Wallace in his volume on "Darwinism."—The southern extension of the Appomattox formation, by W. J. McGee. In a paper entitled "Three Formations of the Middle Atlantic Slope," published in this *Journal* in 1888, a distinctive late Tertiary formation well displayed on the Appomattox River in Eastern Virginia was defined and named after that river; and its principal characters, distribution, stratigraphical relations, and probable age were recorded. The present number contains the result of an extension of the research into the Carolinas, Georgia, Alabama, and Mississippi.—An experimental proof of Ohm's law, preceded by a short account of the discovery and subsequent verification of the law, by Alfred M. Mayer. The experiment described is very suitable for lecture demonstration, and all details are given. A low-resistance Thomson galvanometer is joined up to a box containing coils of 1, 2, and 3 ohms resistance, and to a coil of wire wound round a disk of wood which slides on an upright magnet 1·5 cm. in diameter. The quick movement of this coil causes the production of a magneto-electric current, and adopting the conception of the lines of magnetic force it may be said that a ring with one coil cuts a certain number of these lines, this cutting of the lines causes the current, and is the electromotive force. A ring with two, three, or four coils cuts two, three, or four times the number of lines, and increases the electromotive force in the same proportion. The resistance in the circuit can also be changed by means of the resistance coils, and hence it can be proved that the current is directly as the electromotive force and inversely as the resistance by observations of the galvanometer deflections.—Microscopic magnification, by W. Le Conte Stevens. If F be the equivalent focal length of the eye-piece of a microscope, f that of the objective, T the tube length, and D the distance of distinct vision, the magnification, M, is expressed by the formula $M = \frac{(D + F)(T - f)}{Ff}$. —Notes on the minerals occurring near Port Henry, N.Y., by J. F. Kemp.—Occurrence of goniolina in the Comanche series of the Texas Cretaceous, by Robert T. Hill.—A method for the reduction of arsenic acid in analysis, by F. A. Gooch and P. E. Browning.—On the development of the shell in the genus Tornoceras, Hyatt, by Dr. Charles E. Beecher.—Fayalite in the obsidian of Lipari, by Jos. P. Iddings and S. L. Penfield. —On some selenium and tellurium minerals from Honduras, by Edward S. Dana and Horace L. Wells. The locality from which the minerals were obtained is the El Plomo mine, Ojojoma District, Department of Tegucigalpa, Honduras. An analysis of one showed that it contained 29·31 per cent. of selenium and 70·69 per cent. of tellurium, the great proportion of selenium constituting it the nearest approach to native selenium which has yet been found in nature. It is proposed to call this mineral selen-tellurium. Some tellurium-iron minerals are also described.—Some connellite from Cornwall, England, by S. L. Penfield.

American Journal of Mathematics, vol. xii., 4 (Baltimore, July 1890).—This number opens with a short note (pp. 323-336) on confocal bicircular quartics, by Prof. Franklin, and closes with a memoir on the theory of matrices, by H. Taber (pp. 337-396.) The memoir is a full investigation of the subject, touching upon the results already obtained by Cayley ("Theory of Matrices," *Phil. Mag.*, 1858), Hamilton ("Quaternions," 1852), the two Peirces, and Clifford. The writer was not aware of Buchheim's paper, with an identical title, in the London Mathematical Society's Proceedings (vol. xvi.) until after his own paper was written. There is much which is substantially the same in the two memoirs, but Mr. Taber claims to have "treated the whole subject more in detail and more systematically than Mr. Bucheim" (*sic*).

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, July 15.—M. Hermite in the chair. New studies on the rotation of the sun, by M. H. Faye. An account is given of Dr. Wilsing's observations of faculæ for the purpose of determining the time of rotation, and of the recent work done by M. Dunér, in which Fizeau's method was adopted.—On the photography of the polarization fringes of crystals, by MM. Mascart and Bouasse. A method of obtaining photo-