

June 7 of this year. Weather and locality have been against my seeing clear sunsets until to-day, when no unusual effects were noticeable; but Mr. Bishop's letter makes it possible that in other places similar effects may be observable.

GRENVILLE A. J. COLE.

Royal College of Science for Ireland, Dublin, December 4.

#### ELECTRICAL STANDARDS.

THE following supplementary report has been presented to the President of the Board of Trade by the Electrical Standards Committee:—

To the Right Hon. A. J. Mundella, M.P., President of the Board of Trade.

Subsequently to the presentation of our former report to Sir Michael Hicks-Beach in July, 1891, we were informed that it was probable that the German Government would shortly take steps to establish legal standards for use in connection with electrical supply, and that, with a view to secure complete agreement between the proposed standards in Germany and England, the Director of the Physico-Technical Imperial Institute at Berlin, Prof. von Helmholtz, with certain of his assistants, proposed to visit England for the purpose of making exact comparisons between the units in use in the two countries, and of attending the meeting of the British Association which was to take place in August in Edinburgh.

Having regard to the importance of this communication, it appeared desirable that the Board of Trade should postpone the action recommended in our previous report until after Prof. Helmholtz's visit.

That visit took place early in August, and there was a very full discussion of the whole subject at the meeting of the British Association in Edinburgh, at which several of our number were present. The meeting was also attended by Dr. Guillaume, of the Bureau International des Poids et Mesures, and Prof. Carhart, of the University of Michigan, U.S.A., who were well qualified by their scientific attainments to represent the opinion of their respective countries.

It appeared from the discussion that a few comparatively slight modifications of the resolutions included in our previous report would tend to secure international agreement.

An extract from the report of the Electrical Standards Committee of the British Association, embodying the results of this discussion, was communicated to us by the Secretary, and will be found in the appendix to this report.

Having carefully reconsidered the whole question in view of this communication, and having received the report of the sub-committee mentioned in resolution 14 of our previous report, we now desire, for the resolutions contained in that report, to substitute the following:—

#### RESOLUTIONS.

- (1) That it is desirable that new denominations of standards for the measurement of electricity should be made and approved by Her Majesty in Council as Board of Trade standards.
- (2) That the magnitudes of these standards should be determined on the electro-magnetic system of measurement with reference to the centimetre as unit of length, the gramme as unit of mass, and the second as unit of time, and that by the terms centimetre and gramme are meant the standards of those denominations deposited with the Board of Trade.
- (3) That the standard of electrical resistance should be denominated the ohm, and should have the value 1,000,000,000 in terms of the centimetre and second.
- (4) That the resistance offered to an unvarying electric current by a column of mercury at the temperature of melting ice 14.4521 grammes in mass of a constant cross sectional area, and of a length of 106.3 centimetres may be adopted as one ohm.

(5) That a material standard, constructed in solid metal, should be adopted as the standard ohm, and should from time to time be verified by comparison with a column of mercury of known dimensions.

(6) That for the purpose of replacing the standard, if lost, destroyed, or damaged, and for ordinary use, a limited number of copies should be constructed which should be periodically compared with the standard ohm.

(7) That resistances constructed in solid metal should be adopted as Board of Trade standards for multiples and submultiples of the ohm.

(8) That the value of the standard of resistance constructed by a Committee of the British Association for the Advancement of Science in the years 1863 and 1864, and known as the British Association unit, may be taken as .9866 of the ohm.

(9) That the standard of electrical current should be denominated the ampere, and should have the value one-tenth (0.1) in terms of the centimetre, gramme, and second.

(10) That an unvarying current which, when passed through a solution of nitrate of silver in water, in accordance with the specification attached to this report, deposits silver at the rate of 0.001118 of a gramme per second may be taken as a current of one ampere.

(11) That an alternating current of one ampere shall mean a current such that the square root of the time-average of the square of its strength at each instant in amperes is unity.

(12) That instruments constructed on the principle of the balance, in which, by the proper disposition of the conductors, forces of attraction and repulsion are produced, which depend upon the amount of current passing, and are balanced by known weights, should be adopted as the Board of Trade standards for the measurement of current whether unvarying or alternating.

(13) That the standard of electrical pressure should be denominated the volt, being the pressure which, if steadily applied to a conductor whose resistance is one ohm, will produce a current of one ampere.

(14) That the electrical pressure at a temperature of 15° centigrade between the poles or electrodes of the voltaic cell known as Clark's cell, prepared in accordance with the specification attached to this report, may be taken as not differing from a pressure of 1.434 volts, by more than one part in 1000.

(15) That an alternating pressure of one volt shall mean a pressure such that the square root of the time-average of the square of its value at each instant in volts is unity.

(16) That instruments constructed on the principle of Lord Kelvin's quadrant electrometer used idiostatically, and, for high-pressures, instrument on the principle of the balance, electrostatic forces being balanced against a known weight, should be adopted as Board of Trade standards for the measurement of pressure, whether unvarying or alternating.

COURTENAY BOYLE. G. CAREY FOSTER.  
KELVIN. R. T. GLAZEBROOK.  
P. CARDEW. J. HOPKINSON.  
W. H. PREECE. W. E. AYRTON.  
RAYLEIGH.

T. W. P. BLOMEFIELD, Secretary.

November 29.

#### ON THE PHYSIOLOGY OF GRAFTING.<sup>1</sup>

THE volume before us contains the record of several years of research upon the effects of different forms of grafts (using the term in its widest significance) in the vegetable kingdom.

<sup>1</sup> "Ueber Transplantation am Pflanzenkörper. Untersuchungen zur Physiologie und Pathologie." Von Dr. Hermann Vöchting. Mit 11 Lithographierten Tafeln und 14 Figuren im Texte. (Tübingen: Laupp, 1892.)