REPORT

OF THE

THIRTEENTH MEETING

OF THE

BRITISH ASSOCIATION

FOR THE

ADVANCEMENT OF SCIENCE;

HELD AT CORK IN AUGUST 1843.

LONDON:

JOHN MURRAY, ALBEMARLE STREET.

1844.

Report of the Committee, consisting of Professor WHEATSTONE, Mr. HUTTON, *and the General Secretaries and Treasurer, appointed by the Council to superintend the establishment of Meteorological Observations at the Kew Observatory.*

THE limited funds at the disposal of the Committee have not allowed them to carry many of the contemplated objects into effect. The preliminary arrangements have however been completed, and a very perfect and efficient apparatus for making observations on the electricity of the atmosphere has been established. The Committee has paid more immediate attention to this subject on account of its importance in connexion with the system of simultaneous magnetic and meteorological observations now making on various points of the earth's surface, in the recommendation of which the Association has taken so prominent a part. Hitherto electrical phænomena have been little attended to at these observatories, from the want of knowing what instruments to recommend for the purpose, and how to interpret properly their indications. This want the Committee has every reason to believe will shortly be supplied and arrangements be made for recording the electrical changes of the atmosphere at the various stations with the same regularity and accuracy as the other meteorological phænomena.

The following is a brief notice of the present arrangements.

The dome in which the Equatorial was formerly placed, has been converted into the Electrical Observatory. A circular pedestal about eight feet in height is firmly fixed in the middle of the room, and a platform, which is ascended by a few steps, surrounds the pedestal, so that the operator standing upon it shall be at a convenient height to adjust and observe the various instruments. At the centre of the pedestal is fixed a strong glass pillar supporting a vertical copper tube tapering upwards; the length of this conductor is twenty feet, sixteen feet being elevated above the dome in the open air. The lower part of the conductor within the dome carries four horizontal branches placed at right angles to each other; these are for the purpose of bringing into connexion with the conductor the various electrometrical instruments employed. The electricity of the atmosphere is collected by means of the flame of a lamp kept constantly alight during night and day, and placed at the upper extremity of the conductor; by this plan, which Volta recommended, much more electricity is collected than by means of a metallic point; the lamp is lowered and elevated when required by means of a cord and pulley contained within the tube.

The insulation of the conductor is preserved by the effective method proposed by Mr. Ronalds. The insulating glass support has in its interior a hollow conical space the base of which opens into the pedestal; beneath this opening is placed a small night-lamp, which heats the air within the cone and raises the temperature of the glass pillar. The upper part of the external surface of this pillar is not sufficiently heated to prevent the deposition of moisture, and is therefore, to a certain degree, a conductor; the lower part also conducts slightly on account of its elevated temperature; but there is a zone between these two parts which insulates perfectly on account of the temperature of that part of the surface being sufficient to expel all moisture and yet not sufficient to enable it to conduct. A conductor thus insulated will retain its charge for hours together without sensible diminution.

Another peculiarity and advantage of this method of insulation is, that the active parts of all the electrometers are suspended from the conductor, and are therefore uniformly charged, depending for their insulation on the warmed

glass pillar only, and not, as usual, upon separate insulators which dissipate the electricity unequally.

The instruments which are at present in action are,—1st, two Volta's straw electrometers, one degree of the second corresponding with five degrees of the first; 2nd, a Henly's electrometer, one degree of the scale of which is equivalent to ten degrees of the least sensible of Volta's electrometers; 3rd, a modification of Coulomb's torsion electrometer, which, while it possesses the sensibility of the most delicate of Volta's straw electrometers, has a range as great as the preceding three instruments; 4th, a dry pile electrometer; 5th, a discharging electrometer for measuring the lengths of sparks; 6th, an atmospheric galvanometer with 2400 well-insulated coils, made by Gourjon of Paris; 7th, Mr. Ronalds's modification of Landriani's electrograph, an ingenious instrument which records, during the absence of an observer, the electrical states of the conductor, distinguishing the positive from the negative states, and to a certain degree the variations of intensity. Many other instruments are in progress from which new and useful results are expected, but which it would be at present premature to mention.

Since the apparatus has been completed the conductor has remained constantly charged, unless purposely discharged, or during the momentary transitions from one electrical state to the other. The electric tensions vary in serene weather between 3° and 90°, and the diurnal changes are indicated with great precision. This report is accompanied by a sectional drawing of the Electrical Observatory, and by a register of observations commenced on July 1st, and continued regularly for six weeks. Observations made during the same time with the barometer, pluviometer, thermometer, psychrometer, Daniell's and Saussure's hygrometers, &c., are also annexed to the report.

Report on the Electro-magnetic Meteorological Register. *By* Professor WHEATSTONE, *F.R.S.*

THE electro-magnetic meteorological register which I undertook to construct for the Observatory of the British Association is just completed. I will defer to a future occasion a full account of its mechanism, and of the various modifications I have devised to render it suitable for the different purposes required in meteorological investigations; such an account will more properly accompany the record of the daily working of the instrument, which I hope to present at the next meeting of the Association. I will confine my present report to a concise description of the instrument in its present state, but before proceeding to this I will briefly mention what it effects.

It records the indications of the barometer, the thermometer and the psychrometer every half-hour during day and night, and prints the results, in duplicate, on a sheet of paper in figures. It requires no attention for a week, during which time it registers 1008 observations. Five minutes are sufficient to prepare the machine for another week's work; that is, to wind up the clock, to furnish the cylinder with fresh sheets of paper, and to recharge the small voltaic element. The range of each instrument is divided into 150 parts; that of the barometer comprises three inches, that of the thermometer includes all degrees of temperature between $-5°$ and $+95°$, and the psychrometer has an equal range.

The machine consists essentially of two distinct parts: the first is a regulator clock, to which are attached all the regularly recurring movements which require to be introduced; the second is a train having an independent maintaining power, which is brought into action at irregular periods of time by the contact of the plunging wires with the mercury of the instruments, as will be hereafter explained.