

*March 6, 1856.*

Colonel SABINE, R.A., V.P. and Treasurer, in the Chair.

In accordance with the Statutes, the Secretary read the following list of Candidates for election into the Society :—

John Hutton Balfour, M.D.  
 Henry Foster Baxter, Esq.  
 Lionel Smith Beale, Esq.  
 Samuel Husbands Beckles, Esq.  
 Charles Tilstone Beke, Esq.  
 Edward W. Binney, Esq.  
 Sir John Bowring.  
 Edward Mounier Boxer, Capt.  
 R.A.  
 Samuel Brown, Esq.  
 George Bowdler Buckton, Esq.  
 Sir John Fox Burgoyne, Bart.  
 William Coulson, Esq.  
 Thomas Russell Crampton, Esq.  
 Richard Cull, Esq.  
 Hugh Welch Diamond, M.D.  
 James Dixon, Esq.  
 Sir Charles Fox.  
 Philip Henry Gosse, Esq.  
 Robert Harkness, Esq.  
 Cæsar Henry Hawkins, Esq.

Dr. Humphreys.  
 Manuel John Johnson, Esq.  
 Edward Joseph Lowe, Esq.  
 Robert Wilfred Skeffington Lut-  
 widge, Esq.  
 George Macilwain, Esq.  
 David Maccloughlin, M.D.  
 William Marcet, M.D.  
 John Carrick Moore, Esq.  
 Robert William Mylne, Esq.  
 Henry Minchin Noad, Ph.D.  
 Edmund Potter, Esq.  
 Rev. T. Romney Robinson, D.D.  
 Henry Hyde Salter, M.D.  
 William Scovell Savory, Esq.  
 Archibald Smith, Esq.  
 Robert Angus Smith, Esq.  
 Thomas A. B. Spratt, Capt. R.N.  
 Henry Ward, Capt. R.E.  
 Thomas Williams, M.D.  
 Forbes Benignus Winslow, M.D.

The following communications were read :—

- I. Supplement to the “Account of Pendulum Experiments undertaken in the Harton Colliery ;” being an Account of Experiments undertaken to determine the correction for the Temperature of the Pendulum. By G. B. AIRY, Esq., Astronomer Royal. Received February 13, 1856.

(Abstract.)

Adverting to the circumstance that, in the Harton Experiment, there was a mean difference of  $7^{\circ}$  between the temperature above and below, and that a careful determination of the coefficient for temperature-correction was therefore necessary, the author describes the process by which the correction was now investigated by experiment on the same pendulums which were used in the Harton Experiment. Two rooms were selected at the Royal Observatory, Greenwich, having firm stone floors, and admitting of being heated, one by a stove in the room, the other by a hot-air-apparatus below. One pendulum was mounted upon its iron stand, with clock and other apparatus, in one room, and the other in the other room. Care was taken that the pendulums and their thermometers should be effectually protected from radiation. The two clocks were compared by carrying a chronometer from one to the other, and remarking the time of coincidence of beats ; a method which admits of very great accuracy, when (as in this instance) the distance through which the chronometer is to be carried is small. In the Fifth Series (counting the series in sequence to those of the Harton Experiment), Pendulum 1821 was kept in heat, and Pendulum 8 cool, and continuous observations were kept up during forty hours. In the Sixth Series, Pendulum 8 only was kept in heat, and observations were again kept up during forty hours. The Seventh and Eighth Series were similar, respectively, to the Fifth and Sixth. The temperatures are referred to two of the thermometers used in the Harton Experiment, and to two other thermometers supplying the place of two of the Harton thermometers which cannot be found. The observations were con-

ducted entirely by Messrs. Dunkin and Ellis, Assistants of the Royal Observatory.

On discussing the results of the observations, there appears to be reason for supposing that a change has taken place in one of the pendulums after the Seventh Series. This appears from the circumstance that, though the Fifth and Seventh Series agree well, the Sixth and Eighth are discordant; and also from this circumstance, that the abstract relation between the two pendulums given by the Fifth, Sixth, and Seventh Series, agrees closely with that found at Harton; but if the Eighth Series is included, there is a considerable discordance.

If the Eighth Series is rejected, it appears that Colonel Sabine's coefficient ought to be increased by about  $\frac{1}{28}$ th part; and on introducing this correction into the computations of the Harton Experiment, the result for the earth's mean density is 6.809. If the Eighth Series is retained, the correction is reduced to less than one-fourth of that just mentioned, and the earth's mean density is 6.623.

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The author subjoins an investigation with which he has been favoured by Professor Stokes on the effect of the rotation and ellipticity of the earth in modifying the numerical results of the Harton Experiment. It appears that the numbers found in the paper ought to be multiplied by

$$1 + m - \frac{\epsilon}{2} + \frac{3}{2} \epsilon \cos 2l,$$

$$\text{where } m = \frac{\text{equatoreal centrifugal force}}{\text{gravity}}$$

$$\epsilon = \text{ellipticity}$$

$$l = \text{latitude of place.}$$

On converting this formula into numbers, for Harton, the factor is found to be 1.00012, which produces no sensible change in the result.

At the equator the factor would have been 1.00679.