the solar day may be readily explained. The earth's path round the sun, we know, is not a circle but an oval or ellipse. Nor is the sun placed in the centre of this ellipse, but nearer to one end and in the line of the longest diameter of the oval. Now, suppose the earth to be situated in that part of its orbit farthest from the sun, so that every instant of its motion thereafter brings it nearer and nearer, or as we may express it, the earth is now falling towards the sun, and we know that all falling bodies increase in speed the farther they fall, so that the velocity of the earth increases continually until it reaches its point of greatest proximity to the sun. The ratio of its greatest to its least velocity is rather greater than that of 16 to 15, that is the greatest velocity exceeds the least by more than one-fifteenth. It so happens that the earth's greater velocity and also its greater proximity to the sun combine to increase the length of the solar day during the winter months. [The diagram by which this was explained unfortunately cannot be given.]

To explain the other cause of the variation in the length of the true solar day, namely, that depending on the inclination of the earth's axis to the plane of its orbit, would occupy too much of our time at present. It will be sufficient to state that the inclination of the axis gives rise to much greater irregularity than the earth's variable motion in her orbit, the latter making the true solar day too long for about one-half the year and too short during the other half, whereas the former makes the day too short from the beginning of February to the beginning of May, and from the beginning of August to the beginning of November, and too long during the other two periods of three months each. These two causes combined give rise to the following results.—The sun crosses the meridian at 12 o'clock only four times during the year, and then not at regular intervals of three months, but on April 16, June 16, Sept. 1, and Dec. 25. The sun is slow, that is crosses the meridian after 12 o'clock from Christmas day until the middle of April, being farthest behind on the 11th Feb., when he is nearly a quarter of an hour slow. During the next two months he is too fast, and is on the meridian therefore before 12 o'clock. The greatest error during this period is not quite 4 minutes, and occurs on May 14. The sun is slow again throughout the summer months, being 6¼ minutes behind on the 16th July. From the 1st of Sept. almost to the end of the year the sun is too fast, and reaches its maximum error near the beginning of November (Nov. 3), when it is noon by the sun 16⅓ minutes before it is noon by the clock. It may be noticed here that during the winter months, when all the causes which have been indicated combine to lengthen out the solar day the sun loses time most rapidly, the actual loss from the 3rd of Nov. until the 11th Feb.. a little over three months, being more than half-an hour.

Hence we see clearly the necessity for taking not any particular solar day, but the mean or average of all the solar days throughout the year, in order to obtain a reliable standard for the measurement of time. Having thus fixed upon the unit or standard, other divisions of time, as hour, minute, &c., must be defined, with reference to this unit, thus, an hour is properly defined as the twenty-fourth part of a day, and not as sixty minutes, and so on. The unit of time being thus defined, the next step in the Imperial system of weights and measures is the establishment of a unit for the measurement of length. This is made to depend upon the unit of time by an Act of Parliament passed in the fifth year of the reign of George IV., which enacts that if a pendulum which will vibrate seconds in London on a