air was exhausted and the liquid forced up the tube by the pressure of the atmosphere, to a height of 323·571 inches, being equivalent to 30 inches of mercury, the Kew standard at the time reading 30·3 inches. The plug in the cistern was now screwed in its place, to support the column, while the air was admitted at the top and the air-pump connexions removed; a sufficient quantity of glycerine to fill the tube was then poured in and the india-rubber stopper inserted. The screw plug being removed for a few seconds to allow the column to fall an inch or two and then replaced, the instrument was allowed to remain until the liquid in it was completely exhausted of its air, which rose slowly to the surface into the Torricellian vacuum above: then the india-rubber stopper was again withdrawn and the tube finally filled up with glycerine, which had been previously exhausted of air under the air-pump receiver: the stopper was now replaced and the cistern plug finally removed, when the column gradually fell until balanced by the pressure of the atmosphere, leaving a small quantity of glycerine in the cup above the stopper, a plate glass cover being placed on the top to keep out dust. The barometer was now complete and it has since continued in operation. Whether it is to be of any scientific or practical value will be proved by the observations which are now being regularly taken under the superintendence of Mr. Whipple, the Superintendent of the Kew Observatory, to whom I am under many obligations for his kind and courteous assistance during the progress of the work. When the observations are completed I shall ask the honour of submitting them to the Royal Society.

IV. "On a Possible Mode of Detecting a Motion of the Solar System through the Luminiferous Ether." By the late Professor J. CLERK MAXWELL, F.R.S. In a Letter to Mr. D. P. TODD, of the Nautical Almanac Office, Washington, U.S. Communicated by Professor STOKES, Sec. R.S. Received January 7, 1880.

Mr. Todd has been so good as to communicate to me a copy of the subjoined letter, and has kindly permitted me to make any use of it.

As the notice referred to by Maxwell in the "Encyclopædia Britannica" is very brief, being confined to a single sentence, and as the subject is one of great interest, I have thought it best to communicate the letter to the Royal Society.

From the researches of Mr. Huggins on the radial component of the relative velocity of our sun and certain stars, the coefficient of the inequality which we might expect as not unlikely would be only something comparable with half a second of time. This, no doubt, would be a very delicate matter to determine. Still, for anything we know

à priori to the contrary, the motion might be very much greater than what would correspond to this; and the idea has a value of its own, irrespective of the possibility of actually making the determination.

In his letter to me Mr. Todd remarks, "I regard the communication as one of extraordinary importance, although (as you will notice if you have access to the reply which I made) it is like to be a long time before we shall have tables of the satellites of Jupiter sufficiently accurate to put the matter to a practical test."

I have not thought it expedient to delay the publication of the letter on the chance that something bearing on the subject might be found among Maxwell's papers.

<div style="text-align:right">G. G. STOKES.</div>

(Copy.)

<div style="text-align:center">Cavendish Laboratory,
Cambridge,
19th March, 1879.</div>

SIR,

I have received with much pleasure the tables of the satellites of Jupiter which you have been so kind as to send me, and I am encouraged by your interest in the Jovial system to ask you if you have made any special study of the apparent retardation of the eclipses as affected by the geocentric position of Jupiter.

I am told that observations of this kind have been somewhat put out of fashion by other methods of determining quantities related to the velocity of light, but they afford the *only* method, so far as I know, of getting any estimate of the direction and magnitude of the velocity of the sun with respect to the luminiferous medium. Even if we were sure of the theory of aberration, we can only get differences of position of stars, and in the terrestrial methods of determining the velocity of light, the light comes back along the same path again, so that the velocity of the earth with respect to the ether would alter the time of the double passage by a quantity depending on the square of the ratio of the earth's velocity to that of light, and this is quite too small to be observed.

But if JE is the distance of Jupiter from the earth and l the geocentric longitude, and if l' is the longitude and λ the latitude of the direction in which the sun is moving through ether with velocity v, and if V is the velocity of light and t the time of transit from J to E,

$$JE = [V - v \cos \lambda \cos (l - l')] \, t.$$

By a comparison of the values of t when Jupiter is in different signs of the zodiac, it would be possible to determine l' and $v \cos \lambda$.

I do not see how to determine λ, unless we had a planet with an orbit very much inclined to the ecliptic. It may be noticed that whereas the determination of V, the velocity of light, by this method

depends on the differences of JE, that is, on the diameter of the earth's orbit, the determination of $v \cos \lambda$ depends on JE itself, a much larger quantity.

But no method can be made available without good tables of the motion of the satellites, and as I am not an astronomer, I do not know whether, in comparing the observations with the tables of De Damoiseau, any attempt has been made to consider the term in $v \cos \lambda$.

I have, therefore, taken the liberty of writing to you, as the matter is beyond the reach of anyone who has not made a special study of the satellites.

In the article E [ether] in the ninth edition of the "Encyclopædia Britannica," I have collected all the facts I know about the relative motion of the ether and the bodies which move in it, and have shown that nothing can be inferred about this relative motion from any phenomena hitherto observed, except the eclipses, &c., of the satellites of a planet, the more distant the better.

If you know of any work done in this direction, either by yourself or others, I should esteem it a favour to be told of it.

<div style="text-align:center">

Believe me,

Yours faithfully,

(Signed)　　　J. Clerk Maxwell.

</div>

D. P. Todd, Esq.

<div style="text-align:center">

January 29, 1880.

THE PRESIDENT in the Chair.

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The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read :—

<div style="text-align:center">

I. "English Reproduction Table."　By Dr. W. Farr, F.R.S.
Received January 15, 1880.

(Abstract.)

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This table is a development of the English Life Table, from which the fundamental columns of ly and Py are taken, and is intended to show the constitution of the female population, as regards married and unmarried, and the reproductive power at the several ages.

The female population, Py, is divided into married (uxores) unmarried (filiæ), and widowed (viduæ), according to the proportions of these classes of the various ages at the census of 1871; thus, of a total of 14,936,770, aged 15 and upwards, 7,957,456 are wives, 4,660,311 are spinsters, 2,319,003 are widows.