needle was deteriorated, by touching it with the pole, of its own name, of a magnet, a deviation then arose; and communicating the facts to Mr. Barlow, he proceeded to investigate the laws and amount of the deviation so arising.

He distinguishes the action into three several cases:—

1st. When the needle is on any part of the magnetic meridian of the ball. In this case there is no deviation caused by the primary of the shell, nor any secondary deflection produced by deteriorating one pole of the needle.

2nd. When the needle is in the magnetic equator of the ball. In this case he observed, that whichever end of the needle is weakened approaches the ball.

3rd. In every other position, one branch of the needle is nearer to the centre of the ball than the other. Here it is observed, that if the near end is deteriorated, the needle approaches its natural magnetic situation; but if the more distant, then the reverse takes place; and this represents the general law of the phenomenon.

From this law, Mr. Barlow is led to the explanation of the facts, on the principle of induced magnetism in the shell; for in the second case above enumerated, the equilibrium of the needle is produced by equal and opposite repulsions on its equal and equally magnetized ends. When, therefore, the repulsion on one end is weakened by deteriorating that end, that on the other obtains the advantage, and the deteriorated end is drawn towards the ball.

In the general case, the reasoning is equally simple; and Mr. Barlow shows that its results are precisely those which observation affords.

These results he considers as decisive in favour of that theory which regards the magnetism of an iron shell as induced in it by the action of the earth.

He concludes this paper with an account of some experiments instituted for the purpose of determining numerically the amount of the secondary deflections, arising from a given extent of deterioration in the needles. This was estimated by the increase of the times of oscillation in the needle, freely suspended, and the deflections estimated by making the deviations produced by the shell in a series of situations all around it, in various planes; the results of which are stated in a table.

On the Difference of Meridians of the Royal Observatories of Greenwich and Paris. *By* Thomas Henderson, *Esq.* *Communicated by* J. F. W. Herschel, *Esq. Sec. R.S.* Read May 17, 1827. [*Phil. Trans.* 1827, *p.* 286.]

Mr. Henderson, in going over the calculations of the observations made by the Commissioners on the part of the British Board of Longitude and the French Ministry of War, for determining this element, in July 1825, detected an error of one second in the reduction of the observations made at the Royal Observatory at Greenwich, from

mean to sidereal time, and which was set down and calculated on by Mr. Herschel in the paper drawn up by him, containing an account of the operation and the results deduced, on the authority of official communication with the Astronomer Royal. This error falls on the reduction of the single Greenwich observation of the 21st of July; and though partly compensated by an opposite error of three tenths of a second committed by Mr. Herschel himself in the reduction of that day's observations, is still sufficient to account for and correct the great and perplexing deviation of that day's results from those of the other three days in which only the signals proved successful.

The effect of Mr. Henderson's correction is, therefore, to redeem the result of the observations of the 21st of July from the suspicion which attached to them; to produce a change of one tenth of a second in the final result of the whole operation, giving $9^m\ 21^s{\cdot}5$ for the most probable difference of longitude between the two observatories; and, as Mr. Henderson observes, triples the value of the result obtained, by narrowing the extreme range of the experiments from $0^s{\cdot}65$ to $0^s{\cdot}21$. After a minute re-calculation of the whole work, and the revision especially of the rates of the chronometers, (by which that used at Fairlight appears to have kept a better rate than was at first supposed,) Mr. Henderson concludes his paper with the application of the doctrine of probabilities, to determine the weights of the several observations, and the probable error of the final result, which comes out $0^s{\cdot}07$, though the actual uncertainty, he thinks, may amount to $0^s{\cdot}2$.

Some Observations on the Effects of dividing the Nerves of the Lungs, and subjecting the latter to the Influence of voltaic Electricity. *By* A. P. W. Philip, *M.D. F.R.S. L. and E.* Read May 10, 1827. [*Phil. Trans.* 1827, *p.* 297.]

The author, in this paper, first recapitulates the results obtained by him in a paper published in the Philosophical Transactions for 1822; by which it appears that the secreted fluids of animals are so deranged, by dividing the nerves of the secreting organs, as to be incapable of performing their functions; but that they may be restored to their former powers by transmitting voltaic electricity through the secreting organs by the portion of the divided nerves attached to them. In this paper, the functions of the stomach were chiefly considered; in the present, he proposes to consider those of the lungs.

When the nerves of the 8th pair, supplying the lungs, are divided, the animal breathes with difficulty, and speedily dies of suffocation. If the lungs be examined after death, their cells are found so completely filled with a viscid fluid, as to obliterate them entirely, as well as the air tubes. They sink in water; and from a description by Mr. Cutler, which is stated by Dr. Philip at length, it appears that they are rendered impermeable to injections.

The author then states, on his own testimony and that of various other gentlemen who have witnessed the fact, that if the due degree