2. A Letter to Sir John W. Lubbock, Bart., F.R.S. &c., "On the Stability of the Earth's Axis of Rotation." By Henry Hennessy, Esq., M.R.I.A. &c. Communicated by Sir John Lubbock. Received November 20, 1851.

The author refers to a communication to the Geological Society by Sir John Lubbock, in which he appeals, in support of the possibility of a change in the earth's axis, to the influence of two disturbing causes, which appear to have almost entirely escaped the notice of Laplace and Poisson in their investigations on the stability of the earth's axis of rotation:—1. The necessary displacement of the earth's interior strata arising from chemical and physical actions during the process of solidification. 2. The friction of the resisting medium in which the earth is supposed to move.

With reference to the first of these disturbing causes, the author states, that in his Researches in Terrestrial Physics (Philosophical Transactions, 1851, Part 2.), he has been led to conclusions which may assist in clearing up the question. From an inquiry into the process of the earth's solidification which appears to him most in accordance with mechanical and physical laws, he has deduced results respecting the earth's structure which throw some light on the changes which may take place in the relation between its principal moments of inertia, which relation is capable of being expressed by means of a function which depends on the arrangement of the earth's interior strata.

He then states that he has found strong confirmation of his peculiar views respecting the theory of the earth's figure, in the experiments of Professor Bischof of Bonn, on the contraction of granite and other rocks in passing from the fluid to the solid crystalline state. From the results of these experiments, he has been led to assign a new form to the function expressing the relation of the earth's principal moments of inertia. Referring to his paper for the mathematical processes by which he arrived at this result, he states that, from the theory he has ventured to adopt, it follows that, as solidification advances, the strata of equal pressure in the fluid spheroidal nucleus of the earth acquire increased ellipticity, and each stratum of equal density successively added to the inner surface of the solid crust is more oblate than the solid strata previously formed.

From these considerations alone, he remarks, it is evident that the difference between the greatest and least moment of inertia of the earth would progressively increase during the process of solidification. It follows, therefore, that if the earth's axis of rotation were at any time stable, it would continue so for ever. But from the laws of fluid equilibrium the axis must have been stable at the epoch of the first formation of the earth's crust; consequently it continued undisturbed as the thickness of the crust increased during the several geological formations. Thus it appears that the displacement of the earth's interior strata, instead of having a tendency to change its axis of rotation, tends to increase the stability of that axis.

With reference to inequalities arising from the friction of a resisting medium at the earth's surface, the author observes that they could not exist, if, as in the manner here shown, the axis of rotation coincided from the origin with the axis of figure.

In conclusion, he remarks, that if we could assume for the planets a similarity of physical constitution to that of the earth, the theorem as to the difference of the greatest and least moments of inertia of the earth would be applicable to all the planets; and thus we should be as well assured of the stability of our system, with respect to the motion of rotation of its several members, as we are already respecting their motion of translation.

In a postscript, referring to a third cause of disturbance in the place of the earth's axis of rotation, suggested in a letter from Sir John Lubbock, namely, the effects of local elevation and depressions at the earth's surface, the author states; if, with Humboldt, we regard the numbers expressing the mean heights of the several continents as indicators of the plutonic forces by which they have been upheaved, we shall readily see that these forces are of an inferior order to those affecting the general forms and structure of the earth. If the second class of forces acted so as not to influence in any way the stability of the earth's axis of rotation, the former class might, under certain conditions, produce a sensible change in the position of the axis. But when the tendency of the second class of forces is to increase the stability of the earth's axis, it would not be easy to show the possibility of such conditions as to render the operation of the other forces, not only effective in counteracting that tendency, but also capable of producing a sensible change in the place of the axis of rotation.

3. A paper was in part read, entitled, "On the Arrangement of the Foliation and Cleavage of the Rocks of the North of Scotland." By Daniel Sharpe, Esq., F.R.S., V.P.G.S. Received November 20, 1851.

February 19, 1852.

WILLIAM SPENCE, Esq., V.P., in the Chair.

The reading of Mr. Sharpe's paper, "On the Arrangement of the Foliation and Cleavage of the Rocks of the North of Scotland," was resumed and concluded.

The author applies the term, *cleavage* or *lamination*, to the divisional planes by which *stratified* rocks are split into parallel sheets, independently of the stratification; *foliation*, to the division of *crystalline* rocks into layers of different mineral substances; *slate*, to stratified rocks intersected by cleavage; and *schist*, to foliated rocks only which exhibit no bedding independent of the foliation.

He considers that no distinct line can be drawn between gneiss and mica schist, chlorite schist, &c., which pass from one into the