the means of destroying both kinds of aberration in a large focal pencil, and of thus surmounting what has hitherto been a chief obstacle to the perfection of the microscope.

On the Pendulum. *By* J. W. Lubbock, *Esq. F.R.S.* Read March 11, 1830. [*Phil. Trans.* 1830, *p.* 201.]

The ingenious and beautiful application, made by Capt. Kater, of Huygens's theorem respecting the convertibility of the centres of suspension and oscillation, to the determination of the length of the simple pendulum, is to be considered as a first approximation to the solution of this problem. The accuracy of this determination, however, may be affected by many circumstances which the theory does not take into account; and the object of the author in this paper is to investigate the limits of the errors that may arise from neglecting them. Laplace and Whewell have shown that when the knife-edges are considered as cylinders of small but of equal radii of curvature, their distance is still equal to the length of the simple pendulum. The author treats the question with the utmost generality, and discusses all the circumstances which may affect the accuracy of Capt. Kater's method, including all possible deviations and positions of the axes. He takes, as an example, the pendulum used by Mr. Baily, and described by him in the Philosophical Magazine of last February; and investigates the errors which would arise in the length of the simple pendulum corresponding to given deviations of the knife-edges. He also considers the case in which the agate planes are fixed on the pendulum, and vibrate on a fixed knife-edge; and finds that the length of the simple pendulum is here also equal to the distance between the planes.

On the Theoretical Investigation of the Velocity of Sound, as corrected from M. Dulong's *recent Experiments, compared with the Results of the Observations of Dr.* Moll *and Dr.* Van Beek. *By Dr.* Simons, *Assistant at the Observatory of the University of Utrecht. Communicated by Captain* Henry Kater, *Vice-President.* Read March 18, 1830. [*Phil. Trans.* 1830, *p.* 209.]

Laplace has demonstrated that Sir Isaac Newton's formula for obtaining the velocity of sound, requires, in order to render it correct, that it be multiplied by a certain co-efficient, depending on the ratio between the specific heats of atmospheric air under a constant pressure, and under a constant volume. Laplace has endeavoured to deduce this coefficient, first from the experiments of MM. De la Roche and Berard; secondly, from those of MM. Clement and Desormes; and lastly, from the more accurate investigations of MM. Gay-Lussac and Welter. By applying this correction, the velocity of sound, deduced from calculation, corresponded very nearly with the results of actual experiment. Still, however, a degree of discordance was always found to take place. With a view to perfect

the theory still further, Dulong attempted, by reversing the process of Laplace, to deduce the coefficient by which the Newtonian formula is to be multiplied, directly from experiments themselves. The object of the present paper is to compare the investigation of Dulong with the experiments on the velocity of sound made by Drs. Moll and Van Beek, of which an account was lately published in the Philosophical Transactions. By applying the values of the coefficients thus obtained, the computed velocities of sound came out much nearer to the observed velocities; and the author concludes by remarking, that such differences as yet remain between calculation and experiment, may with great probability be ascribed to the errors, which are unavoidable in observations of so complicated a nature.

On the Elasticity of Threads of Glass, with some of the most useful Applications of this property to Torsion Balances. By William Ritchie, *A.M. F.R.S., Rector of the Royal Academy of Tain.* Read March 18, 1830. [*Phil. Trans.* 1830, *p.* 215.]

The author proposes the employment of threads of glass in the construction of torsion-balances, in place of the silver wire, used by Coulomb for the measurement of minute electric or magnetic forces. He describes a galvanometer of his invention, acting upon this principle, the intensity of the galvanic current being measured by the torsion of a slender filament of glass, to the lower end of which a magnetized needle is fixed at right angles. He also applies the same power to the improvement of the sensibility of the common balance for weighing minute bodies, by affixing to the beam a long glass thread horizontally in the axis of suspension, by the torsion of which, when the balance has been brought nearly to a level, the more accurate adjustments are to be effected. On the whole he considers that glass, from its perfect elasticity, possesses decided advantages over metallic wires, for the construction of instruments acting on the principle of torsion.

Memoir on the occurrence of Iodine and Bromine in certain Mineral Waters of South Britain. By Charles Daubeny, *M.D. F.R.S. Professor of Chemistry in the University of Oxford.* Read May 6, 1830. [*Phil. Trans.* 1830, *p.* 223.]

The author lays claim to being the first who announced to the public the existence of bromine in the mineral springs of England; a discovery similar to that which had been previously made by others in many analogous situations on the Continent. His reason for offering the present communication to the Royal Society is, that he has examined on the spot a great number of mineral springs, and endeavoured to obtain, wherever it was practicable, an approximation to the proportion which iodine and bromine bear to the other ingredients. He has also aimed at forming an estimate of their comparative frequency and abundance in the several rock formations, an ob-