much more volatile than silver, and states an experiment made with mercury in the winter of 1824-25, where no action on gold-leaf, suspended over it, however near, took place, from which he concludes the mercury then to have been perfectly fixed; and other experiments on mercury and on sulphuric acid by Sir H. Davy and Signor Bellani are adduced in support of the same view.

But there is another force, that of homogeneous attraction, which the author regards as sufficient to overcome a certain degree of vaporous elasticity; and he illustrates the mode of action of this force by an experiment on the slow crystallization of camphor, and by that of other substances from vapour in the process of sublimation; and by analogous phenomena in the crystallization of salts from aqueous solutions.

On Electrical and Magnetic Rotations. By Charles Babbage, *Esq. F.R.S. &c. &c. Communicated May* 29, 1826. Read June 15, 1826. [*Phil. Trans.* 1826, *p.* 494.]

The author first recapitulates the manner in which he conceives time to influence the results of the magnetic phenomena observed by M. Arago, and which need not here be repeated, being in substance that given in a paper on the subject, in the Transactions of last year, stated in a more geometrical form. As the reasoning in this argument requires only that an attractive or repulsive force should be communicated from one body to another in a finite time, it occurred to him that electricity might be substituted for magnetism, and that rotations analogous to those observed by M. Arago might be produced by the use of electrified instead of magnetic bodies. He accordingly suspended by a fine silk thread a thin brass bar with circular ends over a disc of glass; and the bar being electrified by contact with excited sealing-wax, the glass was made to revolve slowly, when the bar was observed to be dragged round in the same direction. The effect was decided; and all proper precautions were taken to avoid disturbing causes, such as currents of air, twist of the silk, &c. The effect was greatest with a slow velocity of rotation, about five turns in a minute. On substituting a stick of excited sealing-wax for the brass bar, the same effect was produced; but when the rotation of the plate was rapid, the stick remained nearly immoveable. The same effect was produced when the glass plate was covered with plates of copper, lead, or other metals cemented to it.

A proper apparatus being constructed for the purpose of further experiments, an excited electrophorus was made to revolve under a flat needle of thin brass with circular ends, with various degrees of rapidity. The motions of the needles were irregular and complicated, but appear to the author capable of explanation, as well as the others on the same principle,—that electricity excited by induction is not instantly destroyed by removing the inducing body.

The great velocity with which electricity travels in conducting bodies having been urged as an objection to this explanation, the author combats this objection, on the ground that small differences of electricity ought (from analogy with a fluid similarly circumstanced,) to be equalized more slowly than great ones; and moreover, that by the disposition of the apparatus, extremely weak forces being made to act constantly and for a long time, ought to produce an effect much superior to that arising from the transient action of each part.

The author next proceeds to examine the action of screens interposed; and having first satisfied himself by direct experiments with unelectrified metallic plates and needles, that currents of air driven through a screen of muslin produced no sensible effects, he placed a screen of coarse gauze between an electrified sealing-wax needle and a revolving pewter plate, and to his surprise found a tendency to motion in the needle, opposite to that of the plate; and though not always produced, nor always to the same extent, this effect occurred in seventeen out of twenty trials.

The author then looked out for some method of increasing the inequality of distribution of electricity on the metallic plate; he therefore placed on the revolving apparatus, just under the metal plate, a very small lighted lamp. Several experiments made with this disposition of the apparatus are related, without leading to any conclusion as to the action exerted on the needle; and the author then proceeds to consider what extraneous causes could have acted to produce the small retrograde motions observed. First, such causes are enumerated as currents of air in the room, in the box containing the apparatus; currents driven through the screen by rotation; currents of heated air from the lamp; vibrations from the mechanism producing the motion; torsion of the wire *suspending*, or electricity of the bridge *carrying*, the needle; and flexure of the wax.

Before relating the experiments made to elucidate each of these disturbing causes, however, he proceeds to relate other experiments, confirmatory of the fact of the retrograde motion, and of the influence of the heat in producing it; after which, he describes a great variety of experiments, made for the purpose of trying the effect of the presence or absence of the disturbing causes; and concludes that none of them, singly or combined, are adequate to produce the phenomena observed.

He then proceeds to state what appears to him to be their true explanation, on the principles adopted respecting the non-instantaneous communication of electricity; or at least to show that they are not repugnant to those principles; or that, moreover, those principles may in certain cases give rise to a retrograde motion, or to no motion at all, or a direct one, according to the disposition of the apparatus; and that very trifling apparent differences in the latter respect may give rise to all the varieties of the phenomena.