March 18, 1886.

Professor G. G. STOKES, D.C.L., President, in the Chair.

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

The following Papers were read:—

I. "The Relationship of the Activity of Vesuvius to Certain Meteorological and Astronomical Phenomena." By Dr. H. J. JOHNSTON-LAVIS. Communicated by Professor JUDD, F.R.S. Received February 26, 1886.

(Abstract).

The determination of the relations, if any such exist, between volcanic activity and certain astronomical or meteorological phenomena, cannot fail to throw much light upon the vexed question of the solid or liquid condition of the earth's interior. M. Perrey, as the result of his careful catalogue of earthquake phenomena, believed himself to have proved that these could be shown to have certain maxima and minima, which correspond with positions of the moon in relation to the earth and sun; there are many considerations which point to the conclusion that great and sudden changes in barometric pressure may be followed by outbursts of volcanic violence; and, finally, if the eruptions of volcanoes, as many geologists believe, are due to water percolating from the surface to a heated magma, rainfall must have no inconsiderable influence in determining the periods of their occurrence.

The author of the paper has made use of the opportunity of a residence in the neighbourhood of Vesuvius, to chronicle, according to a scale devised by himself, the varying quantities of vapour emitted from the crater during its usual quiet and continued (Strombolian) stage of eruption; the period of every new outflow of lava, or of any increase in the flow of lava was also noted. These observations having been carried on daily for a period of one year and nine months —from October, 1883, to June, 1885—were recorded in tabular form side by side with the moon's quadratures and position in her orbit; with these are also arranged the daily records of the height of the

barometer, and the amount of rainfall supplied to the author by Professor Brioschi of the Capodimonte Observatory.

From the discussion of these tables, it is concluded by the author that there is a striking relationship between the curves which mark sudden changes in atmospheric pressure and those which indicate distinct variations in the volcanic activity. As regards the relation of changes in volcanic activity with the lunar positions, the author speaks with greater doubt, the period over which the observations have extended being insufficient to justify definite conclusions; but he believes that his observations point to distinct tidal influences as affecting the liquid magma beneath the volcano.

II. "On an Apparatus for connecting and disconnecting a Receiver under Exhaustion by a Mercurial Pump." By J. T. Bottomley, M.A., F.R.S.E. Communicated by Sir William Thomson, F.R.S. Received March 1, 1886.

In experimental work with vacua, and especially with the high vacua given by the Sprengel pump, a connecting tap has often been much wished for which would enable the experimenter to remove a piece of apparatus from the pump for examination or preliminary experiment, and afterwards to reapply it to the pump without discharging the vacuum. So far as I am aware nothing satisfactory has hitherto been suggested. The ground glass stopcocks now made by some of the German and English glass workers are undoubtedly very highly finished; but sooner or later, even with the best of them, the air begins to work its way round the grinding marks, in spite of lubricants, and, worse than this, when the apparatus under exhaustion has been removed from the pump and gauges, there is no way of knowing whether or not the air is leaking in round the interstices of the ground glass stopcock.

To meet this difficulty, I have recently constructed a mercurial vacuum tap, which is certainly impervious to air, and which will, I think, be found to work easily and conveniently. In constructing it I have taken advantage of a tap described by Mr. C. H. Gimingham ("Proc. Roy. Soc.," No. 176, 1876), by means of which a piece of apparatus may be disconnected from the pump without discharging the vacuum of the pump; and thus by means of the complete tap, which I proceed to describe, the apparatus under experiment can be separated from the pump and replaced without either the pump or the apparatus being discharged.

The tap consists of three parts. AB is a tube containing a glass float, of which the upper end is conical, and ground very carefully at