plate in front of the thermo-electric pile which he had made use of in his first measurements. He had been induced to remove the rock-salt plate by the conviction that after a time rock-salt developed a quality of transmissibility which was not identical both for luminous and for non-luminous heat. The bare thermo-electric pile showed itself by oft-repeated proofs to be constant towards the rays of a Leslie cube. The relation of the rays from the blackened side of the cube to the rays from the white side continued invariably the same. The same constancy was manifested in the registrations of the thermal element towards the luminous heat of a white-glowing platinum chimney, which was uniformly heated by two gas-flames. The observations of solar heat were made on perfectly bright days and under a perfectly clear atmosphere, the thermo-electric pile being directed to the sun under very different heights, as far as 10°, and exposed to the sun till the diversion of the galvanometer had become constant. The values obtained on the various days and under different solar positions were graphically delineated, on the supposition that the absorption of the atmosphere was an exponential function of its density. The result came out that the "curve" was practically a straight line, or a line concave or convex to so small a degree as to deviate but very little from a straight line. When the curve was lengthened till it met the perpendicular co-ordinate, then the intersecting point representing the magnitude of the solar heat was the same for all days of observation. The deviating results of Mr. Langley and Messrs. Angot and Crova were explained, in part from the fact that in their calculation the reflection of the thermal rays in the different atmospheric strata had not been taken account of, and in part from the fact that the different atmospheric strata were assumed to be parallel, and so their incurvation was left out of account. Notwithstanding the circumstance that the absorption by the atmosphere was different for the different kinds of rays, and also different from day to day, yet was the "curve," the co-ordinates of which were represented by the observed heat and the abscissæ by the logarithms, without exception, a straight line. This empirically ascertained fact was the main result of the whole series of investigations extending over three years.

Physical Society, February 4.—Prof. Helmholtz in the chair.—Dr. Sprung described the barograph designed by him, which avoided the errors of the older balance-barometer (first constructed in 1760 by Samuel Moreland) by making the barometer work on a resting horizontal beam, which through horizontal automatic displacement of a sliding weight was kept always in exact equilibrium. The travelling vertical tread-wheel constantly marked its position on the writing-table of the instrument. Seeing, moreover, that this displacement of the tread-wheel was effected by a clockwork, any disturbance that might arise from its rubbing against the barometer was completely precluded. The automatic equilibration of the beam of the balance was produced by an electric current. The speaker had quite recently instituted a series of the most various experiments, by which he demonstrated how the registering balance designed by him was with great advantage available for a large number of physical investigations: how, for example, he was able by his balance to permanently register the state of the quicksilver in the barometer; the progress of the evaporation of alcohol; the discharge of a fluid from a capillary tube; the change of intensity in an electric current; the evaporation of water through a clay-ball; the changes of density in the atmospheric air recorded by the variations of rise on the part of a large glass ball; and phenomena connected with permanent change of weight. The registering balance, which was being executed by the mechanician Fues in Berlin, allowed, in short, a large series of physical processes to be automatically recorded, and would prove highly useful in many physical investigations.—Prof. Helmholtz, by an experiment, demonstrated the great cohesion of an air-free column of water. A siphon-shaped glass tube, the longer leg of which was closed and the shorter one open, was filled with quicksilver, and above the quicksilver there was superposed a small quantity of distilled water. If the filling was effected without admission of air, then, on the tube being placed in an upright position, the water adhered to the closed end, and its adhesion supported the quicksilver column, which was longer than the barometer height. The speaker now brought the open end of the siphon tube into communication with an air-pump, and caused to be pumped out as much as down to 2 mm. pressure, but even then the cohesion of the water supported the quicksilver column. Only by shaking was the water column shattered, and the quicksilver immediately sank. If there was no shaking, the apparatus continued for an unlimited length of time unchanged. This contrivance should serve the purpose of electrolysing air-free water and ascertaining the strength of the current under which gas bubbles developed themselves by electrolysis. The experiment showed that on the transmission of a current of 2 volts the water continued adherent. The depression of the quicksilver column in consequence of gas development occurred, however, in an experiment with a current of 2·15, and in another with a current of 2·18 volts.

February 18.—Prof. Schwalbe in the chair.—Dr. Frölich spoke of his measurements of the solar heat in the years 1883, 1884, and 1886, and refuted at length the objections which had been raised against these measurements by MM. Vogel, Langley, Angot, and Crova. In the discussion following thereon, Dr. König stated that experiments carried out in the Physical Institute with a Langley bolometer indicated that very considerable influence is exercised by the air-currents on this delicate measuring-instrument.

BOOKS AND PAMPHLETS RECEIVED

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