the production of the line-spectrum of nitrogen, and the expansion of the F line of hydrogen, depend entirely on the intensity of the charge communicated to the Leyden jar. When the pressure of the gas between the electrodes is high, the discharge does not take place until the jar is fully charged; but as the exhaustion proceeds a less and less charge is communicated to the jar, and the discharge at last is virtually not more than that of the simple current.

The same effect may be produced by interposing a break in the circuit, the length of which may be increased as the pressure in the tube is reduced. Plücker and Hittorf appear to have used a break, as in their paper in the Philosophical Transactions, Nov. 1864, they speak of the expansion of lines obtained by increasing the charge of the jar by an interposed stratum of air. They do not, however, appear to have noticed that the reduction of pressure in the tube was only equivalent to a diminution of the charge of the jar, and that to this cause many of the changes of spectra which accompany the reduced pressure ought to be ascribed.

We are continuing our experiments on the effect of temperature on the spectrum, but prefer to reserve this portion of the subject for the present.

May 8, 1873.

FRANCIS SIBSON, M.D., Vice-President, in the Chair.

The following communications were read:—

I. "The Action of Light on the Electrical Resistance of Selenium." By Lieut. SALE, R.E. Communicated by J. N. LOCKYER, F.R.S. Received March 28, 1873.

It having been recently brought to notice that selenium in the crystalline condition exhibits the remarkable property of having a conductivity varying with the degree of light to which it is exposed, the following experiments were undertaken with a view to the further elucidation of the matter:—

Experiment 1.—A bar of crystalline selenium measuring approximately $1{\cdot}5'' \times {\cdot}5'' \times {\cdot}05''$ was procured, and platinum wire terminals were fastened to the ends.

The bar itself was then enclosed in a box having a draw-lid, so as to admit or exclude the light at pleasure.

Then, the lid of the box being on, the resistance of the selenium was measured by means of a high-resistance galvanometer and a Wheatstone's bridge, with dial-coils capable of measuring up to 10,000,000 ohms. The battery-power was 2 cells Daniell.

The measurement was made on a dull cloudy day, and in a room of equable temperature.

The resistance having been carefully balanced, the lid of the box was withdrawn, when the resistance of the selenium fell instantaneously and

considerably, as indicated by the rapid movement of the spot of light on the galvanometer-scale.

Experiment 2.—The transition from darkness to the light given by an ordinary gas-burner (conditions as before), caused a slight and barely perceptible fall in the resistance.

Experiment 3.—The bar of selenium was next tried in the solar spectrum on a very bright cloudless day (conditions as before), except that more battery-power was used (10 cells Daniell).

The diffused daylight could not be cut off; so the trial was made in the most shaded part of an ordinary room, the spectrum being superimposed on the ordinary diffused daylight.

The resistances were very carefully balanced in each case, with the following results:—

Resistance in darkness	330,000
,, ,, violet	279,000
,, ,, red	255,700
,, ,, orange	277,000
,, ,, green	278,000
,, ,, blue and indigo	279,000
,, ,, centre of red	255,000
Resistance just on the outside edge of red, red side	220,000
Resistance in dark rays clear of red	228,000
Resistance in diffused daylight only	270,000
Resistance taken in the dark immediately after exposure (resistance rising)	310,000

The indications were very clear; and the bar of selenium was so sensitive to the action of the spectrum, that a slight movement of the prism produced a corresponding movement in the spot of light on the galvanometer-scale.

It is to be noted that in this experiment the reflecting galvanometer was placed on a heavy masonry pillar insulated from the floor for observatory purposes, and that the battery, bar of selenium, and resistance-coils were in another room, being connected by long and carefully insulated leads with the galvanometer.

Experiment 4.—The diffused light was cut off as much as possible by screens; and the resistances were again balanced in the solar spectrum. Conditions as in the last case.

Resistance of selenium in red	240,000
,, just outside red	240,700
,, in blue	270,000
,, in such diffused light as came through screens	290,000
Light cut off by lid of box (resistance rising)	310,000

Experiment 5.—The selenium was also exposed to the spectrum of the electric light in a darkened room.

The effect was feeble; but by using more battery-power in balancing, it was possible to measure the swing of the spot of light when the selenium was suddenly exposed to the action of the light of the spectrum.

The maximum effect was obtained in, or just at the edge of the red, the violet and blue rays producing scarcely any effect.

Experiment 6.—The selenium was exposed to the full sunlight; the resistance fell enormously and instantaneously, and on balancing it was found to be little more than half what it was in the darkness.

The following were the general results of the experiments:—

Results.—(1) That the resistance of selenium is largely affected by exposure to light.

(2) That this effect is not produced by the actinic rays, but is at a maximum at, or just outside the red rays, at a place nearly coincident with the locus of the maximum of the heat-rays.

(3) That the effect of varying resistances is certainly not due to any change of temperature in the bar of selenium.

(4) That the effect produced on exposure to light is sensibly instantaneous, but that, on cutting off the light, the return to the normal resistance is not so rapid.

It would seem that there exists a power in rays nearly coincident with the heat-rays of high intensity, of altering instantaneously and without change of temperature the molecular condition of this particular element.

II. "Researches in Spectrum-Analysis in connexion with the Spectrum of the Sun."—No. II. By J. Norman Lockyer, F.R.S. Received March 14, 1873.

(Abstract.)

The observations in this paper are a continuation of those referred to in the previous communication bearing the same title. They deal (1) with the spectra of chemical compounds, and (2) with the spectra of mechanical mixtures.

I. *Chemical Compounds.*

Several series of salts were observed; these series may be divided into two:—1st, those in which the atomic weights varied in each series; 2nd, those in which the associated elements varied in each series. The following salts were mapped:—

$Pb\,F_2$, $Pb\,Cl_2$, $Pb\,Br_2$, $Pb\,I_2$; $Sr\,F_2$, $Sr\,Cl_2$, $Sr\,Br_2$, $Sr\,I_2$; $Ba\,F_2$, $Ba\,Cl_2$, $Ba\,Br_2$, $Ba\,I_2$; $Mg\,F_2$, $Mg\,Cl_2$, $Mg\,Br_2$, $Mg\,I_2$; $Na\,F$, $Na\,Cl$, $Na\,Br$, $Na\,I$.

The conditions of the experiments are described. The same aluminium cups, described in the first paper, were used; and the poles were arranged