A course of lectures on electricity, delivered before the Society of Arts

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ELECTRICITY
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BY

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LONDON
LONGMANS, GREEN, AND CO.
AND NEW YORK: 15 EAST 10th STREET

1888

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the silk and glass one on each side of the ball, and you see that the ball is acted upon by the space between the silk and glass so as to move from the glass towards the silk. After having touched the glass, the ball is acted upon by the electrified space in the same way as the glass was in the previous experiment (moving towards the silk). If, now, I first make it touch the silk and then hang it up, you see that the electrified space moves it towards the glass. In each case, contact with rubbed glass or silk causes the electrified space to act on the ball in the same way as it does on the material touched. We found before that the rubbed silk and glass are acted on by the space so as to move in opposite directions. We now find that after the light ball has touched the rubbed silk or glass the electrified space moves it also in opposite directions. In each case the ball is said to be electrified by contact, but there is something different in the two means of electrifying the ball. We must denote this by some language, we say that the ball is positively electrified if it moves towards the silk, and negatively if it moves towards the...
glass. It follows from this that, after the glass and silk have been rubbed, the glass is positively and the silk negatively electrified. We have now learnt that when an electrified body touches another which is not electrified, it takes some of the electrical condition from that other body.

If I have two metal balls on shellac fibres and touch the rubbed silk with one and the rubbed glass with the other, the one is said to be positively and the other negatively electrified. If the two are now made to touch, each is as much influenced by positive as by negative electrification. Thus both become neutral. (It will be understood presently that if the balls were not both conductors contact at every electrified part would be necessary to destroy the electrified condition.)

These actions of the space on an electrified ball and on rubbed glass and silk are the same as if two positively electrified bodies repel each other, and as if two negatively electrified bodies repel each other, and as if a positively electrified body attracts a negatively electrified body. Hence a rule is often given which saves time in stating the facts, namely, that 'like electricity repel, unlike electricity attract.' This is a most unscientific way of speaking, because there are no such things as electricity. Electricity is merely the science of electrical phenomena. Nor is it even true that the electrified bodies attract and repel each other. It is the electrified space which acts on the electrified bodies and makes them act as if they attract and repel each other. All this must be remembered if the above rule is quoted.

I have used a rod or sheet of glass and a strip of silk in these experiments; other materials would act similarly, though not always with the same intensity. Sealing-wax might be rubbed on flannel or cat's fur and the same effects would be observed. The rubbed sealing-wax if suspended
in a paper stirrup between the mutually rubbed silk and glass would move from the silk towards the glass. Hence it is negatively electrified. The cat's fur or flannel is positively electrified. The most extensive experiments have all gone to prove that we cannot electrify one body positively without at the same time electrifying another negatively to an equal extent. In fact the only effects which we have observed or can discover are those produced in and by the electrified space lying between those bodies which we say are positively and negatively electrified.

![Gold-leaf Electroscope](image)

**Fig. 4.**—Gold-leaf Electroscope.

F. Glass jar. W. Metal rod. T. Metal disc. L. L'. Gold leaves. When T is electrified, L and L' diverge, and take up the position of the dotted lines.

(When I speak of the space *between* two bodies I mean the space separating them, not necessarily in a straight line between them.) When I electrify one body by contact with an electrified one, what is given to the one is taken from the other.

I will now show you two instruments used for detecting feeble electrification. The first is the gold-leaf electroscope. A rod of metal has a metal knob or flat disc at the top.
and two strips of gold-leaf facing each other at the bottom, and it is passed through the stopper of a jar at its middle. The gold-leaves are very light and the jar prevents currents of air from blowing them about. I touch the disc with a positively electrified body. The two leaves L and L' become positively electrified. There must of course be a negatively electrified body somewhere. Call it F. The space which separates the leaf L from F includes the positively electrified gold-leaf L'. Hence L' moves from L and towards F. So also the space separating the other leaf L' from F is electrified and acts on L. Thus L and L' are caused to diverge when an electrified body touches the disc. You see this when I rub a piece of glass with silk and touch the disc with it. There now, the leaves diverge.

The other instrument for detecting feeble electrification is the quadrant electrometer. I will not now describe the