

by a few instantaneous contacts sending  
a Daniell current thro' the cell,  
I forget whether you denied that this  
was possible or not. It is quite  
possible.

The light cells stand any amount of  
exposure & come up fresh - quite  
undeteriorated by the exposure!

Altogether, the subject is hopeful -  
not only as a piece of theory, but as  
a practical measure of light.

I scorn now to work with Day light.

It gives huge e.m.f.'s. A match  
light will also give measurable results  
even with a Thomson Q.<sup>c</sup> - not  
Clifton's form - wh. gives only 44  
div<sup>us</sup> for a Daniell.

I'll write again soon.

This subject has given me 2 or 3 headaches,  
& the book on Hydrastatis languishes  
for a while.

M.



Springfield Cottage,  
Englefield Green,  
Staines,  
Nov. 17.

10/30

Φ,

Just a line to say that I believe I am  
now near the end of the Photoelectric  
business.

What I have discovered is this.

The e.m.f. developed when a given light  
falls on the battery (its poles being  
connected with a Thomson Q.<sup>c</sup> Volt<sup>er</sup>)  
is prop<sup>l</sup> to the  $\sqrt{\text{intensity}}$  of the light, &  
 $\therefore$  inversely as the distance of the light  
from the battery. This is somewhat  
natural  $\because$  the static energy of the  
battery  $\propto (\text{e.m.f.})^2$ .

This law verifies with very great  
accuracy, considering the difficulty  
of getting a candle at the same distance  
from all the cells & measuring the

distance. A naked candle held in front of a battery of 6 cells at a distance of  $\frac{6}{8}$  inches gives an e.m.f. of almost exactly half a Daniell.

When the light is put on, the e.m.f. rises slowly and attains its max. in about 5 minutes, & sticks bit like a man.

When the light is withdrawn, the e.m.f. falls slowly.

I am going to send you pictures of the curves of rise & fall, properly plotted.

The whole theory of a battery receiving incident energy at a constant rate & not

expending it in current has given me and Gregory a great deal of trouble to work out; but a hypothesis which I made (among a dozen) some days ago turns out to be right.

If at any time during the incidence of the light  $w$  is the mass of stuff partially

or totally decomposed by the light, I assume, as natural, that

$$\frac{dw}{dt} = kI(A-w)$$

where  $k$  is a constant,  $I$  = power of light,  $A$  = a constant.

$$\text{This gives } w = m + n e^{-kIt}$$

a log. curve, wh. is verified.

Part of the incident energy goes, of course, to heating the general body of the liquid in the cell.

I have not made a theory of the curve of fall; but Gregory finds that it also is a log. curve.

The subject is closely related to the theory of a polarisable cell (2 Pb plates in H<sub>2</sub>O) charged by a battery. We have traced curves of fall for such a cell, the curve of rise being far too rapid. I have a math. theory of this case also, wh. remains for verification.

Moreover, it is perfectly possible to pump out the residual effect of the light on the Photo. battery, & do to hasten another experiment. This is done

