

11/59 30 Rue de la Clef  
Paris. April 22. 1889.

Dear Sir

I was glad to receive your letter, and some objections you state are certainly noteworthy and definitely put. I shall take time to consider them. But the last one about the rate of vibration being dependent on the length of the ether column, or distance apart of the terminals, I think may possibly be got over. For (as I set forth) the vibration may be chiefly radial - rather than\* longitudinal.

In Nature May 20, 1880 p 66, & July 1, 1880, p 204, you may see accounts of effect of lightning, and Prof. Colladon's view from observation.

He says the destructive effect diminishes radially from a central axis, when the flash is. It is a curious point that if anything like my view or analogy be true, the flash may be simultaneous throughout its

\* Besides division into several segments seems to

enter length, even if several miles long - independently of the velocity of transmission - : if (as in my view) the movement of the wave be radial from\* all sides. The wave converges as if to the line focus of a cylindrical lens. This line is the flash, in my idea. A tree then is struck laterally (from <sup>equally</sup> all sides) not longitudinally. In this way, the branches would (as Prof Colladon observed they were) be injured to an increasing degree as their lateral distance from the flash diminishes.

I hang my idea may be broadly true, but imperfect.

As regards theories of the constitution of the ether, it is a curious fact (pointed out by me in my little book "Physics of the Ether") that if the <sup>assumption</sup> of "action at a distance" be rejected, which prevents any explanation, be rejected, but our solution to the (seems) problem of the constitution of the ether ~~remains~~

\* The rarefied areas (about which the column vibrates) would cause the "attraction", and the filling up of the areas would be the accompaniment of the radial converging wave.

but given if this even could allow  
any other constitution than that of a  
gas, I should be glad of information  
on this point

For Prof. Maxwell, I find, seemed  
to be of the view that if the ether be  
molecular, it must be a gas. He says  
in his address "On the Dynamical  
Evidence of the Molecular Constitution  
of Bodies", Nature March 4 & 11, 1873 -  
"A molecular ether would be neither more  
nor less than a gas" (p 377).

But now Maxwell a few lines further  
on (p. 377) puts what he thinks a  
fatal objection to the ether being  
molecular - viz that the ether would  
be detected in our experiments on  
the specific heat of ordinary gases.

I met this objection in the Phil  
Mag. April 1878, p. 308 (a sort of  
\* How can a particle impart an  $\frac{1}{2}$  force more in any other  
direction than a straight line?  
rebody,

\* The dimensions mean distance, mean length of path  
of the ether particle might of course be ununiform  
different from those of an ordinary gas - without  
deviating from the principle.

in gravity, by Phil Mag. Sept & Nov 1877  
Feb 1878) - and I wrote to Maxwell  
about this. In reply he admitted that  
I had shown that the exchange of heat  
between an ordinary gas and the ether  
must be "very slow": which is tantamount  
to surmounting his objection. For if  
the exchange of heat be slow enough,  
the ether would not be noticed in our  
experiments on the specific heat of  
ordinary gases: as it is not.

So according to Maxwell, the  
ether, if it be molecular, must be  
a gas. And seemingly he says - "the  
properties of a body supposed to be  
a uniform plenum (i.e. non-molecular)  
may be afforded dogmatically, but cannot  
be explained mathematically." (Phil. Trans.  
1867, p. 49). Hence, it appears that  
if the ether is to be explained, it must  
be molecular and therefore a gas: or this  
is the more interpretation of Maxwell's  
views above quoted. Maxwell nevertheless  
I believe, supposed something of a rotary motion to  
be at the basis of the ether. If so, does he  
mean that it is non-molecular and therefore  
incapable of explanation? Yours truly  
To Prof. G. F. Fitzgerald FRS - S Tolson Preston