

8 Upper Homsey Rise, N.

13/4 1897, May 17.

Dear George

Trouton's being on the list for the RS, gratified me very much, & I hope we shall be successful with our other candidates Preston and Rambaut. I have often wondered that the biologists had not put forward J Mallet Purser's name. But all those Purser are too indifferent to matters of the kind. Look at John Purser.

As you are very busy I suppose the subject of your letter must stand over till you have the considerable leisure which apparently will be requisite for you sufficiently to digest and assimilate it; and you will I think then see that your present too rough & ready conceptions of wave-motion fall seriously short of enabling you to picture correctly to your own mind what happens in nature.

At present you suppose that a simple grating "will only introduce a finite system of plane waves", but this is a mistake unless the grating be of infinite extent in its plane: and it is a mistake

round which what I suppose to be
other misconceptions seem to group
themselves. 13/4

As respects your regarding the
resolution of a spherical wave into
its tangent planes as much simpler
than my resolution — it, when presented
correctly, i.e. when freed from the
prevalent erroneous idea that they are
only patches of plane waves (which
I fear you harbour), is my resolution;
& the 'buggermugger' as you stigmatise
it by which it is proved is one of
McCullagh's most valuable additions
to the mathematics of Physical Science.

You think ^{the} infinite systems of plane
waves "are generally useless". On
the contrary they enable us to investigate
microscopic vision which no other known
resolution had before succeeded in
doing. They furnish an accurate
investigation of telescopic vision instead
of the approximate one by which Airy
investigated what the image of a star
is. This last is of minor importance
because Airy's approximation is sufficiently

close for astronomical purposes. The
other is of importance because it accomplishes
what was often attempted but never before
done. And it is not of minor importance
that the resolution into infinite plane
waves also helps us to dismiss many
errors out of our own conceptions of wave-
motion. 134

You say you "cannot see why" I
"object to the analytical calculation of
a system of plane waves that represent
the actual motion" This is an entire
mistake. I never did object to any
such calculation whether leading to a
useless or a useful result. What I
objected to were two mistaken statements
one on p 283, "This [Preston's equation] then
is the analytical expression of the general
theorem enunciated by D^r Stone"; and
the other on p 281 "When the disturbance
is a function of a single variable this
statement forms the verbal expression of
Fourier's Theorem" — both of which are
wide of the truth. Again your words
are "to the analytical calculation of
of a system of plane waves that represent
the actual motion" — in reference to which
it sh^d be borne in mind that an expansion

by Fourier's theorem, or by Preston's extension
of it, has no vector element and does not
represent the actual motion. It is on
this account, & on account of diffraction
being ignored, that I suspect (though,
as I explained before, I do not know)
that your mode of proving the lemma
is unsound. Keep in view that the
vector parts of the displacements, or what
comes to the same thing the vector parts
of the velocities are, even in a monotropic
medium, functions of θ & ϕ and are
different in the various different directions,
and also that a uniform plane wave
of finite extent laterally never propagates
itself.

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I see no 'petitio principii' in showing
that the exclusively forward propagation
of a wave is deducible from the assumption
that every punctum in the medium is
a centre from which spherical waves are
propagated symmetrically backwards &
forwards. But I do see in it the correction
of a mistake so prevalent that so far as
I know it is found in every text book.
There is not room to go into other parts
of your letter also requiring discussion.

With love all round

Your affectionate Uncle
G. Johnstone Stone,