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Approved*

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Joshua Lederberg

September 26, 1960

Dr. Brian O'Brien
Vice President for Research
American Optical Company
Southbridge, Massachusetts

Dear Doctor O'Brien:

Charlie Phillips recently made available to me the report of the NRC Chemistry Committee concerning biological aerosol alarms on which you sat in May 1958. I was very pleased to see this though I might have wished the event had come sooner since this committee went over a good deal of ground that some of my colleagues and I have gone over again in connection with exobiology. (Note enclosure.)

One item in particular exactly paralleled an instrument that I had in mind for UV microspectrophotometry with the aim of scanning individual particles. Just as you suggested, I had thought of concentrating the light input into a convergent pipe terminating in a fiber of just about one micron diameter. This would then constitute a low aperture condenser lens. The light having passed through the particle would then be collected by a high aperture objective such as one of the new Zeiss ultrafluor and the signal then recorded from a high gain photomultiplier and amplifier. Scattering in the specimen may prove to be the most difficult stumbling block; but closely related to this is the problem of delivering a sufficient intensity of light through a small fiber.

I have been thinking of the convergent pipe but I wonder whether the theory for this has already been well developed. I'm not sure as to the total gain that can be anticipated if c is the angle of convergence of the pipe and a the angle of entry of a beam, the total number of reflections that can be sustained within the pipe will be $n = \frac{19 - a}{c}$. Can you refer

me to any published theory and experimentation along these lines? In fact, for a novice like myself, it would be very helpful to have any available material by way of bibliography on basic aspects of fiber optics - especially in the context of work in ultraviolet.

Another important aspect of our intended system that will require more work is rapid spectral scanning with display, for laboratory purposes, on a CRO. I understand that your company has already produced such an instrument for use in the visible and I would very much appreciate any available details. It would be of great value for us right now to have a comparable instrument on the bench that could be used for UV spectrophotometry between 2400 and 3000 Å.

Your help in these matters will be most cordially appreciated.

Enc: 87

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