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PALMER PHYSICAL LABORATORY

PRINCETON UNIVERSITY

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Professor Joshua Lederberg
Department of Genetics
Stanford University School of Medicine
Stanford Medical Center
300 Pasteur Drive
Palo Alto, California

Dear Professor Lederberg:

This is in reply to your letter of January 12th. While the possibility of other physical constants, in addition to the gravitational constant, changing with time has been occasionally considered in the past, the evidence seems to rather strongly suggest that none of these affects take place. The affects which have been considered have been the variation in the ratios of masses of elementary particles and the electromagnetic coupling constant. The very precise gravitational experiment performed by Eötvös and several more recent precise experiments set stringent limits on the variability of dimensionless numbers of this type. I would conclude that the only physical constant which we need to consider as variable is the gravitational constant.

You are quite right about the brightness of stars in the past being greater, however, this would only show up on very distant galaxies where there is already very great uncertainty concerning the absolute brightness. Galaxies change their absolute luminosity for other reasons such as the gradual depletion of gas and the resulting decrease in the rate of formation of new bright stars.

Because of your interest in genetic questions, I wonder if I could give you a question? It might reasonably be presumed that genetic materials are among the oldest biological materials that we have. Is there any evidence that they incorporate particularly stable amino acids (that is stable from a thermal point of view)? The point to this question is that if living forms had their origin at a time of rather high temperatures, one might expect to find biological materials at this time capable of survival under high temperature conditions.

Sincerely yours,


R. H. Dicke

RHD:mf