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Dr. Joshua Lederberg
Department of Genetics
University of Missouri *Wisconsin*
Madison, Wisconsin

Dear Dr. Lederberg,

Thank you for your letter. Only a few weeks ago I had the opportunity of talking to Dr. B.D. Davis during a meeting of the A.C.S. at Austin, Texas. You may perhaps have heard that *B₇* has not only been isolated but also chemically identified as carnitine, a betaine which has been isolated before from meat extracts. We have also now found that *E. coli*, when grown synthetically, does not contain *B₇*, or could only contain it in the minutest amounts. It is therefore not surprising that our efforts to produce a *B₇*-less mutant were unsuccessful. We have no microbial assay of *B₇*, but there is a vague possibility that we would succeed with *Neurospora* where we failed with *coli*.

As to your query about microsymbionts etc., there has been very little work in this field, except for some new work in Germany which has not yet been published. Professor Buchner is writing a new book which should be out early in 1952 (at Birkhauser, Basel) and there was a symposium on symbiosis during the International Congress of Entomology at Amsterdam last summer at which I was one of the speakers. The full report of this symposium will appear very soon (if it has not already appeared) in a Dutch entomological Journal. You will find the most recent references, mostly to unpublished work, in the papers given by A. Koch and L. Toth. The latter did a lot of work on the question of nitrogen fixation by symbionts (which neither Wigglesworth nor myself believes to be true). I think instead of laboriously collecting these few references for you you will find them conveniently presented in that symposium report, and later in Buchner's book. The full account of the work reported in Science 1950 has not yet been written up for publication, but has been resting in a drawer of my desk. I do not know of any other substitution experiments.

Yours sincerely,

G. S. Fraenkel

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