September 15, 1951.

Dr. P. R. Edwards,
Communicable Disease Center,
Public Health Service,
Box 185, Chamblee, Ga.

Dear Dr. Edwards:

Our investigations on the possibility of genetic recombination in Salmonella, especially S. typhimurium, have finally begun to bear some fruit, in a rather surprising way. Mr. N. Zinder, who has been working on this problem in my laboratory as the subject of a doctoral thesis, originally set out to duplicate the methodology originally developed for Escherichia coli by Tatum and myself. However, he has recently discovered a system which resembles, in most of its details, the transformation of pneumococcal types much more closely than the "sexual" system of E. coli.

Exposure of cultures of any one of many strains of S. typhimurium to low concentrations of penicillin or to certain weak bacteriophages results in the elaboration of an "agent" which we call "FA" that seems to be capable of transmitting inherited traits from one bacterium to another. This agent is separated from the bacterial cells by filtration through sintered glass or by heat-sterilization. The traits which have so far been studied include a considerable variety of nutritional requirements (i.e., the transfer is from a wild type to a nutritional mutant), fermentation differences, and resistance to streptomycin (i.e., transfer from a resistant mutant to a normal sensitive). This system differs from the E. coli not only in passing through a bacterial-filter, but also in the fact that here only a single trait is transmitted at one time, whereas E. coli shows definite evidence of linkage. As a starting point for serological studies, we have noted that FA preparations from S. typhimurium are active on S. typhi, transmitting at any one time either the ability to ferment arabinose or rhamnose, streptomycin-resistance, or growth on minimal medium (tryptophane-independence). It has also been noted that FA is absorbed by cells of a variety of serotypes sharing in common the XII somatic antigen. We are now anxious to set up experiments to test the possibility, mentioned in your own writings, of transfer of antigenic specificities. For this purpose, we would be greatly obliged to receive a rather large set of authentic type cultures, as enumerated in the attached list. Our first trials will be dvoted to the replacement of the d antigen of S. typhi by the i.;i,2,3 complex of S. typhimurium. We have some immunizations in progress, but if you could also spare a few ml of d-serum, we would appreciate it very much.

Sincerely yours,

Joshua Lederberg,
Associate Professor of Gen