September 13, 1958

Dear Joshua,

During the transition period here I must get my own work (plus some of Kinoshi's unpubl. obs.) published. The article will be rather long and in a way dull because it stresses method. As you already know the results became much clearer after I dumped glucose out of the window (that is an exaggeration because you can't open windows in the clinical center!) The log phase phase generation time with glyceral as carbon source is of course much longer and I lost a good deal of my night sleep - but it was worth it. I may have told you that galacton in cons. of 1 x 10^{-5} mol. has a bacteriostatic effect on the growth of 3096 (transferase-less) which is quite dramatic (this is a glycerol instead of gluc. as C source). After 14-18 hours a "recovery" sets in which may be selection of mutants. Yet these suspected mutants are still Gal neg. This analysis of this phenomenon is first on the program. Likewise, I am curious to know the effect of galactose on 3096 on the burst size if infected with virulent lambda. Another new observation: 4- epimerase is 10-20 times higher in the presence as in the absence of galactose in 3100, 3096, 3092 - again provided glycerol is the C source.

This is of course not surprising at all. In "Gal 3" (3264 and 3265) in the constitutive 4-epimerase is about 50 per cent (i.e., app. same order of magnitude) as that found in 3100 and 3096. However, add. of galactose in "Gal 3" does not give 10-15 times increase but only 50-75 percent of an increase (which may be within the limit of error). We have found for instance that 4-epimerase conc. is going down to 30-40 per cent in post-log phase as compared with the titer in the middle log phase.

"Gal 9" is of course complete devoid of 4-epimerase, const. as well as induc. The kinetics of galactosidase is also intriguing. In 3096 as follows:

I suspect that in 3096 the gal kin. is almost operating as fast as gal permeace and hence the conc. of free gal in the cell very low. Sufficient to induce gal kin. but in suff. to induce galactosidase until the acc. of gal-1-P (which is staggering) begins to inhib. the phosphorylation of gal. and hence permit the free gal in the cell to attain higher values. This is born out of the fact that in 3100 and 3092 galactosidase increases (on a cellular basis) rapidly right from the beginning. More detailed and precise information later. - Phenol extraction of complex polysaccharides (cell wall, somatic etc) showed no galactose (if any, merely traces) which agrees with the fact that 3099 grows happily on glycerol without gal. - I am interested in marrying off 3099 with a Shigella. Perhaps Yanofsky's deletion mutants will also be helpful.