1086 East 1[illegible]0 Street,
Bronx, New York,
December 23, 1940.

Mr. Henry Platt,
The American Institute Science Laboratory,
310 Fifth Avenue,
New York City.

Dear Sir:

In support of my application for laboratory privileges, I should like to bring to your attention the following program for work in histology and cytology.

Cytology and the Theory of Fixation of Plant + Animal Cells.

1. Cytology and the Theory of Fixation of Plant + Animal Cells.

a. Sections of onion root-tip, fixed in Fleming's or potassium dichromate-chromic acid-acetic acid fixative, stained with iron-hematoxylin or gentian violet, for study of the structure of both the chromatic and achromatic figures, and as a reference for the following:

b. Sections of onion root-tip, fixed in Bouin-Allen's B15 [illegible] adjusted to various pH's, to determine effect of fixative pH on fixation results. Correlated with this, each member of the series is to be stained with iron-hematoxylin, gentian violet, methylene blue, Delafield's hematoxylin, acid fuchsin, and picro-carmine to discover the optimum stain at each pH.

c. Sections of frog testis, same as above.

d. If the above is ever completed, there are a number of other fixatives whose effect varies with their pH. However, a definite conclusion ought to be [illegible] from the above.

e. If osmic acid is available, the interactions of the concentration of osmic acid and time of exposure in fixatives in determining over-fixation or osmication of cells.

f. Inasmuch as osmic acid is so expensive, an investigation to find cheaper satisfactory substitutes would be fruitful in making more facile the work of all cytologists.

g. A comparison of the osmic acid and ferrous iron techniques in detection of the Golgi bodies and a comprehensive review of the literature on them as regards their existence in the living cell, and the formulation of my own criteria.

h. Determination of mitochondria by other than osmic fixatives and stain procedures

i. In vitro reactions of and production of artifacts by osmic acid.

j. Relation between differential staining and particle sizes in emulsions of albumen.

2. Histology – The Comparative Histology of the ~~Mammalian~~ vertebrate Stomach.

a. Serial sections, at intervals of 100μ, of some typical mammal's stomach as a reference series. Stain (Iron-)hematoxylin – eosin.

b. The same for the stomachs of other representative vertebrates — Turtle – Reptilia, Mouse – Mammalia, Frog – Amphibia, Sparrow – Aves, Perch – Pisces, and others if available. From these cross-sections, the construction of detailed models relative to the distribution of the fundus, pyloric and cardiac glands and the thicknesses of various layers in different regions, with a correlation to function in nutrition as far as possible.

I have had some experience in bio- and organic chemistry, especially the latter, and may, on occasions, be called upon to make my own stains, in exceptional cases. However, the program outlined above is sufficiently exhaustive of prospective activity in the happy event that my application, herewith enclosed, is accepted.

Very Sincerely yours,

Joshua Lederberg

Current scientific or research activities:

Currently, I have been able to do work in histology. At the present time, I have been working on the root-tips of narcissus, for mitotic figures, but inasmuch as I have not yet been able to section the blocks prepared, nor to stain any such sections, I cannot say anything conclusive concerning my results here. For the past year or so I have been able, on a rather limited scale to conduct a group in histology as part of the biology club. This group is engaged in studying slides that I have prepared with their assistance. Currently we have just, very cursorily, completed the stomach and duodenum from their histological aspects. In this way, I have been able to learn the technique. Thus far, I have prepared such tissues as I could get and had time to handle, and have been unable to fulfill organized integrated study. I am, however, interested in the comparative histology of mammalian stomachs, with particular reference to the distribution and morphology, and function, of the glands of the mucosa. As far as sum results are concerned, ~~these~~ can be put as answers to a number of individual problems — "What is the histological structure of such and such a tissue, and what is the most satisfactory technique in determining this." In answer, I have slides of about 20 different tissues, some better than others — rat embryo, frog marrow and blood, the spinal cord of the frog, a 6-day chick embryo, head of a late snake embryo, frog stomach — fundus, and stomach-pyloric, pancreas, duodenum, Human, man frog, turtle, rabbit blood with various stains, Cerebrum and cerebellum of cat, frog heart, Frog tongue-gold preparation, frog kidney, spleen and liver, oviduct, the subcutaneous areolar connective tissue of the rabbit as a diversion, an earthworm, and a few inferior ones. The irregularity of the work, made necessary by departmental demands upon the laboratory and its equipment, have, unfortunately, prevented a systematic plan of work. There are now, in particular, a number of problems in cytology that I am most fascinated in, but have been unable to work on in school. It is these problems - relation of fixative to artifacts, and apparent cell-structure, and simpler means of observing and preparing such things as the "Golgi bodies", mitochondria, etc. I may be able to construct a crude micro-dissection apparatus in one of the school shops, and could hope for nothing more than to apply it to the living cell if it is constructed. The equipment needed is expensive, but widely useful and standard — a three-objective microscope with Abbé condenser and immersion objective, a rotary microtome, if possible - about $125 for the best models ($60-$95 or more - at first hand) slides, coverslips, staining jars, and various stains and fixatives, alcohol, dioxan, xylol, and balsam - although these are comparatively inexpensive, and some of which I can provide myself.