

**Geophysical Laboratory**

2801 UPTON STREET, WASHINGTON 8, D. C.

March 8, 1961

OFFICE OF THE DIRECTOR

Dr. Norman Horowitz  
California Institute of Technology  
Pasadena, California

Dear Dr. Horowitz:

I especially appreciated the comments in your January letter concerning the version of my talk in New York. I have since revised the material and it will appear in the April issue of the Proceedings of the National Academy of Sciences. I followed up your comment concerning the work on growth of organisms in a simulated Martian environment reported by Strughold and the group at Brooks Air Force Base, ultimately obtaining a piece of literature entitled "Microbiologic studies on ecologic considerations of the Martian environment" by Irving Davis and John D. Fulton.

On reading this material it became clear that the experiments reported by the Brooks group do not actually simulate a Martian atmosphere. The heart of the matter is in the experimental procedures. Soil and organisms are dried and mixed, water is then added to the soil in an amount to bring the moisture content up to 3 or 4%. The mixture is placed in a closed Martian jar which is then flushed with nitrogen to remove oxygen. This procedure leaves 3 to 4% water in the soil. Once the flushing procedure is terminated, the relative humidity within the closed space must rise to a value near 100% in contrast to the 1% or less present on Mars. Another way of stating the matter is that a 3 or 4% free water content of soil is incompatible with 1% relative humidity under equilibrium conditions.

Having reached this conclusion I spoke with Captain Davis on the phone concerning his experiments and he admitted to me that my view in this matter was correct. I encouraged him to repeat his experiments, suggesting that it would be possible to buffer the moisture content in an environment using an arrangement analogous to that employed in a Warburg apparatus, with the buffer consisting of a system such as sulphuric acid - water. He stated that he and his group would like to do such research when time permitted, but my guess is that he won't be able to do the work immediately and it may be necessary for others to perform the studies if these very important experiments are to be made soon.

Sincerely yours,

ORIGINAL SIGNED BY  
PHILIP H. ABELSON

Philip H. Abelson

cc: Dr. Sagan  
Dr. Lederberg ✓

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