

Memorandum:
To: Westex
From: J. Lederberg

NEXT MEETING The main purpose of this circular is to remind you of our planned meeting to be held at Stanford about September 12th. If there are some dates in that vicinity that would be inconvenient please let me know. Davies will not be back until about Sept. 8; the Stanford Medical Center will have its formal dedication Sept. 17 - 18.

POSITION PAPER

The main item of business for Westex - 4 is the adoption of a draft of a "position paper" of the Academy. This will be reviewed by the Board in October to be promulgated as a formal statement of goals and cautions on behalf of the Academy. I will be preparing a draft to circulate to you before the meeting -- this will be based on our previous discussions. Please write me any thoughts or after-thoughts that should be in the circular, particularly as they may go beyond what is already in the previous bulletins. Carl Sagan is at Berkeley for the summer (c/o Leuschner Observatory) and will be writing a technical résumé on planetary environments as an appendix to this paper.

CONTINUED SUPPORT The Space Science Board of the NAS has expressed its vigorous appreciation of the work Westex has been doing and will give its support for whatever further consultative work we would care to do, including such further meetings as we hold. It is not an operating agency but it can, and will, back experimental projects that may be submitted to NASA, NSF, etc., either directly or through Westex. NASA is just starting its shop for biological projects but it is soliciting them now. So if any of you have some ideas you want to implement either send them in directly or bring them up for discussion at Westex-4 or both.

DECONTAMINATION A technical committee on decontamination met at Stanford on July 8. It included representatives from MAS, NASA, JPL, General Electric Co., and Fort Detrick (Ch. Phillips). It went over particular aspects of treatment of the third stage and payload. Ethylene oxide is far and away the most promising approach; it may be necessary to use other methods (heat, radiation, sterile assembly?) for some special items that are hermetically sealed. Fort Detrick is willing to do the developmental and control work; the committee is forwarding a strong recommendation that Detrick be awarded a contract to do the job. If this is done I think we need no longer spend too much time on this problem and can concentrate on positive objectives.

TOLERANCES A knotty problem that Davies has to bring up is our quantitative standards for performance in sterile probes. What is an acceptable upper level of mathematical expectation of the numbers of viable spores deposited on a planet?

This will be a probability product of the initial contamination load, the pre-flight sterilization procedure, the increment during atmospheric flight, losses during free flight, atmospheric reentry and impact, and probability of successful mission. I have suggested 10^0 as an upper level to aim at -- in the present state of design, perhaps only 10^{-2} of this need represent the initial sterility of the probe. However, as ~~more~~ successful, softer landings are programmed, the initial decontamination

will also have to be improved. Perhaps this tolerance is not cautious enough -- if, in due course, 10^7 flights are made we would have established a risk of 10^{-7} of a planetary infection. But before then we should know enough more to make a better judgment. What are your thoughts?

BACK CONTAMINATION It will be some time, but ultimately space craft may be recovered on earth after having made at least an atmospheric entry at another planet. Can we assess the acceptable tolerance for the risk of a "contamination" of the earth. Should this be 10^{-8} , 10^{-9} , ...? Against such a tolerance, how would we match the a priori likelihood of a deleterious effect of back-contamination? Perhaps even more than in the issue of planetary infection we have to compute expectations by taking a limit product that amounts to $\infty \times 0$. However, it is easier to insist on defending the earth than other planets. There will be some time before this issue has to be decided, but we should start some imaginative thinking on the possible consequences of re-infection. Human disease per se is (in my opinion) the least likely but far from the only possibility.

MARS PROBE The mission discussed at our last session has been cancelled for the time being. As I understand it the projected power requirements for guidance and stabilization left too little margin for communications and a useful experiment. One consolation is the time this gives to perfect the experiments. The next missions are likely to be lunar hits or grazes with the aim of a close-up picture.

ORGANIZATION This is always puzzling. Enclosed is a reference to the Bioastronautics Committee, of which Calvin is a member. I do not know what is the outcome if any of discussions on its relationships to other groups. The enclosure indicates the special relationship of the Committee to the military and to the man-in-space programs. The Space Science Board of the NAS is a successor to the IGY committee. It has been advisory mainly to NASA and in the early formulation of general policy in space science. As an organ of the NAS the Board seeks to express the consensus of scientific judgment. The chairman of the Space Science Board is Lloyd Berkner; appointments to it are made by Detlev Bronk as president of the Academy.

The role of exobiology in the space program is crystallizing; it can now be more explicitly represented by virtue of my own recent appointment to the Board. Westex has been de facto one of the subcommittees of the Board; it should perhaps be more formally recognized as such, as should come about without difficulty.

OTHER NEWS Davies is presenting a paper on decontamination of probes at the International Astronautics Congress in London early in September. Some members of Westex have been coopted to Calvin's group of the Bioastronautics subcommittee. There is a meeting scheduled at Woods Hole for the week of the 13th. I hope we may have a report on this either by circular or at Westex-4. The overlapping membership should facilitate interchange of information and ideas.