States-of-the Art to survey for potential research effort directed toward unknown areas in L.S.S.

Physiology

1 Olfactory detector for odoriferous Atmosphere Contaminants (qualit. & quant.)
Gases & odors detectable
" " " not detectable

2. Water immersion studies on effects of weightlessness on bone & muscle, GI tract, diet effects, C.V. effects total blood volume

3. Design of exercises to maintain muscle & bone in 0-g

ecological

4. Feeding studies & Biochemical assay of S. lividus.

5. Continuous Harvesting Mechanisms for 0-g use

6. A. R & D of Wall-contained GIPSE-type exchanger for Lunar Flight Vehicle to Moon & as quarters during lunar stay
B. Other applications
1 Satellites ~~stations~~
a. Animal support systems experiments (NASA 1. Primate 14d 2. 100 mice 14d)
b. Manned - MTSS, SLOMAR (SMART), DEIMOS

7. Physiological Handbook Proposed in old RA 518
"Physiological Research Studies" is what is now required by adv. design people. Cancelled in Spring 1961

6. (Continued) Problems inherent in Lunar Vehicle gas exchange systems

A. Nutrients for algae

1. Urine alone - dilution
2. Raw sewage - filtered & unfiltered, homogenized & unhomog. dilution factor. Mixed with urine & unmixed
3. Effect of evolved gases from digestors on algae growth 0-100% mixture ē cabin air (provides CO_2 & other gases G.I.)
4. Additional chemical requirements

B. Algae as food

1. Nutritional Assay
2. Vitamin Assay
3. Processing requirements
4. Toxicity under various conditions
?5. Suitable food types of algae

Mechanical Problems

1. Harvesting mechanisms - filters (suction - pressure) (edible & non edible) centrifugal
2. Processing ~~for food~~
Bleaching, cooking, chemical, ~~treatment~~, pellets, other, wafers, etc. soups

As. fuel (solid)

1. For attitude control ~~rockets~~ - design new rocket case & cartridge insert. Filter, dry, press into case around mandrel - pressure optimum, mandrel shape, size, thrust attained, ignition technic, etc. (or core)
Combustion ē other solids ~~for~~ ~~exot~~ (as a NO_3) to supply O_2

C. Design of culture system for vehicle

Paul Fuller — Deficient areas

RA. 518

Product of was to be a Handbook for Design Engineers.

1. Range of heat output by man as function of kinds of activities. Try to extrapolate to 0g envir.
2. Same for H_2O output
3. " " O_2 consumption
4. " " CO_2 output
5. Effects of 100% O_2 at var. press. levels.

6. Creation of magnetic field in space cabin to protect from radiation 1. Deflection of particles 2. Magnetic field itself counteracts radiation effects (ARS or IAF paper)

7. Optimize atmosphere design

8. Food — composition, proportion, — enterogastrone

9. H_2O immersion — Capt. Hyde (SAM)

Commercial Fallouts from L. Sciences + L.SS. research

Food Production

Aeroponics in desert areas
Antarctic + Arctic Applications
Mountain + Desert Sites for
  Microorganism Culture
Commercial greenhouses - vegetables

Waste Conversion

Home Units
Shelters
Command Posts (SAC Hq Cheyenne - etc Mt. Col Spgs.)
Congressional Shelters @ strategic locals

Algae Tanks as Filter Units For

Home + shelter Air Conditioning Syst
Command Posts Underground
Gov't Personnel Shelters
Civilian Shelters

Sensor Development

R.H.
CO_2
B.P. graft. (arterial)
Other

Medical Electronics

BCG techniques for 0-g (B.P. meas)