(4) *Potato Respiration.*—To determine whether sprouting potatoes will change their rhythmic biological processes when subjected to a zero gravity environment.

IMPORTANCE OF AAP–3 AND AAP–4

In the long term, a well-planned and adequately supported program of astronomy using orbital telescopes can contribute significantly to the resolution of important scientific problems. By extending the range of accessible wavelengths and the levels of faintness, it can clarify the problem of stellar evolution and the origin of the universe. By permitting an increase in the sharpness of images attained, it can permit an attack on the existence of remote planetary systems, some of which may harbor life. And by increasing the power and spectral bandwith over that obtainable on the ground, it can push even further the studies, of remote objects initiated with ground-based instruments. It is worth noting that many of the general philosophical questions for which such a program has great implications have great interest for the general public.

The sun is the ultimate source of all energy on the earth, and natural conversion of this energy has provided us with such resources as oil, coal, and wood. It has been estimated that in the last 100 years, the world has used an amount of energy approximately equivalent to the quantity consumed in the previous 1800 years. In the last century, the increase in energy used has been tenfold and the rise in increased consumption is continuing.

A major and largely untapped source of energy is that obtained directly from te sun in the form of solar energy. Approximately 32,000 times as much energy as the human race is currently using reaches the earth's surface each year. Were we able to efficiently harness a sizeable portion of this energy, our energy source problem could be solved. Therefore, a better understanding of the sun, its activities, and its influence upon the earth is basic to practical applications.

The ATM, with its improved capabilities and techniques, will provide major contributions toward a better understanding of these questions. Initial steps are being taken by NASA to develop an optimized space astronomy program. Studies have been made in this regard and others are currently in process. NASA is working with the National Academy of Sciences and with some of the leading astronomers to develop the best approach to a space-borne general astronomical observatory.

Additionally, ATM will establish the basic technological advances, enabling us to achieve a large space-borne astronomical observatory. It is expected that it would be man-tended in that man would maintain it, focus and repair instruments, replace parts as required and change and return film. The ATM and OAO are current development steps being conducted in parallel, leading toward this objective. In gathering data regarding solar phenomena, the ATM incorporates man into the data gathering loop and also provides for the use of photographic film for obtaining high resolution data at a high data rate. The OAO, being an automated spacecraft carrying instrumentation to study stellar astronomy, provides experience in long term operation of astronomical scientific instrumentation in a space environment. The combination of these two programs provides the logical development know-how to obtain the currently viewed optimum astronomy program.

The Apollo Telescope Mount experiment has been endorsed by the President's Science Advisory Committee. The Committee has stated in its February, 1967 report that astronomy is an appropriate choice as a primary objective in our National Space Program. In addition, the Committee envisions an evolutionary development of earth orbiting astronomical facilities designed to take advantage of the unique opportunities which are offered by observations from space. The ATM will provide the basis for future work in stellar astronomical observations as well as expanded capability for solar astronomy studies. To not accomplish the AAP–3 and AAP–4 flights within the concepts described herein will seriously curtail long duration astronomical observations in space by man. Without AAP–3 and AAP–4, the maximum time available for manned experiments of this type would be limited by the present Apollo capability which is 14 days maximum.

The continuous gathering of solar data by such equipment as the ATM and the ultimate large space laboratories of the future, will provide man on earth with fundamental information on which to base practical applications which will benefit his own welfare.