in space sciences is exactly what Siekevitz pleads for—direct support of research in these fields; and the experiments are most often designed and programmed by university scientists (as for example, Van Allen, Whipple, Goldberg).

Siekevitz next says that the "inclusion of molecular biology among the beneficiaries of space research is particularly ludicrous." But the real point is not, as he puts it, the question of spores in space, but the question of the universality of life, and the impact that a positive (or a negative) answer would have on the question of the origin of life. Our observations on both micro- and macromolecular biology today are little more than descriptive analyses, and we are probably sampling from only one "test tube" among the millions or billions (or more) present in the universe. To give an example of an intramural NASA research program of importance to molecular biology, the formation of adenine, guanine, amino acids, and ATP, from simple starting materials and under conditions probably similar to those found on a primordial planet, has been shown by Ponnamperuma and his coworkers at this laboratory. Anyone involved in any phase of "molecular" biology must realize the value of further extensions of this synthetic approach to understanding the origin of biological molecules. Additionally, NASA grants are held by Calvin, Marmur, and N. O. Kaplan, among others, all doing basic biological research.

The point at which Siekevitz completely exposes his unawareness of the intent of the NASA program is with his statement, ". . . in my opinion the only scientific research arising out of space technology, out of NASA, is a byproduct of the military usages of the space program." Like many others who have not taken time to find out, he does not realize that "activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States . . . shall be the responsibility of, and shall be directed by, the Department of Defense," not NASA.

Since its founding, NASA has taken great pains to devote its main efforts to the peaceful, scientific use of space. NASA's work does impinge on the military aspects of space exploration. It is impossible to do otherwise when dealing with the development of vehicles designed to carry the huge payloads necessary for successful experimentation in space. But NASA's assignment is one of scientific inquiry and development of space technology. Even though the greatest expenditures at present are going into an effort superficially the least scientific—man in space—the rationale for this effort must be apparent: The complete scientific usefulness of the possibilities that space opens up will be achieved only when the scientist himself can leave his earth-bound observation post. NASA is obliged to carry the sphere of research endeavor out of terrestrial laboratories; the ultimate fulfillment of its mission is such an exciting prospect that imaginative minds need no further elaboration.

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Biology Departments Should Buy Natural Preserves

This communication is addressed to colleges and universities and particularly to their departments of biology. It proposes that they have a responsibility in the preservation of the sources of materials used in their studies and that they should institute active programs of land purchases to insure the availability of scientific values.

Many areas once used for collection of biological specimens and for field trips are now lost to the scientific community. Forests have been cut, bogs have been drained, and prairies have been plowed under. Stands of virgin hardwoods and conifers in Wisconsin and Michigan have practically disappeared, and the virgin prairies of Illinois and Iowa no longer exist except in old cemeteries and occasionally in railroad rights-of-way. Urbanization and flooding of valleys behind dams are now changing the ecology of the whole country.

Schools have acquired valuable lands through private gifts and through the efforts of groups such as garden clubs and nature conservancies, but these procedures, in spite of all good intentions, are haphazard, inefficient in selection of areas of high scientific value, and often too slow. It is therefore urged that schools purchase tracts that are now or are potentially important to their biologists. Perhaps departmental budgets for equipment and research should be increased so that the purchases could be made by the departments. The funds involved are small when compared with the monies justifiably spent by other departments on equipment that may become obsolete in a very few years. Scientific areas for the most part become more valuable with age. Furthermore, careful selection of sites can well serve to perpetuate rare biological species that are disappearing as their habitat is being restricted or changed. This program would also permit the establishment of laboratories in their natural state which could be kept private and undisturbed. There is ample precedent for departmental administration of experimental tracts of land; the applied biologists, the agronomists, and the animal husbandry men have been doing it for years.

The important functions of a school are the collection, preservation, and dissemination of information; a heavy responsibility is entailed in the guardianship of sources of information. The community of biological scientists must realize that the "open range" as a source of material is disappearing and they must act to protect their own interests as well as the larger interest of society.

A botanist on the staff of a famous university was exercised because a small privately owned bog was to be sold and would no longer be available as a rich source of specimens and as an area for field trips. He expressed concern over the possibility that an organization such as the Nature Conservancy could not or would not advance the comparatively small sum needed to buy it, but his response to the suggestion that his department of botany should buy it as part of its investment in research was that such a procedure was impossible.

The botanists of a large midwestern university were recently deploring the loss of a red oak complex as a prime research area; the red oaks have been cut, leaving the maples and the white oaks. It now has little value as a research and teaching area. This is only one more instance of the failure of a school and its botanists to act.

This letter carries no implication that there should not be full cooperation between the scientific community and conservation agencies; they should continue to furnish all possible mutual assistance.

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