

1. Greater emphasis on modern ecological principles is needed in high school and undergraduate biology courses, especially the latter. Leading college texts have been quick to upgrade material at the molecular level but have failed to do the same at the ecological level. Suggested solutions: (1) encourage qualified ecologists to take more active part in preparation of elementary texts, or (2) establish a "writing committee" as was successful in upgrading ecology in high school biology texts.

2. The quality of graduate work and training should be increased and more universities should develop strong coordinated programs, i.e., interdisciplinary programs between botany, zoology, microbiology, and applied biological disciplines (forestry, agriculture, conservation, etc.). Very few universities now have such graduate programs. Many universities with the highest overall academic ratings have practically no graduate work in ecology, even though such schools have outstanding individual ecologists on their staffs. Suggested solutions: (1) encourage heads of biological science divisions to get individuals in different departments to work together in graduate training, (2) increase the number of special training grants for interdepartmental programs (see item 6b below) and (3) develop special interdepartmental facilities as described in 3 below.

3. Large scale permanent year around experimental facilities for ecology are a critical need for the future. These should include both laboratory and field facilities for experimental work with entire ecosystems as well as for populations and individual organisms through their entire life cycles. Such facilities are expensive and require large scale government support and, in some cases at least, the cooperation of several institutions is desirable. Since large scale expensive facilities for applied ecology (for example, water pollution laboratories or forestry research laboratories) are now being supported in large numbers by the Federal Government, it is imperative that equally adequate facilities for basic ecological research be similarly supported to avoid an imbalance between basic and applied research that is in danger of developing when basic principles underlying the applications are imperfectly known. Such imbalance in any field leads to a tragic waste of money as trial and error procedures predominate, and expensive equipment and buildings are assembled to be manned by inadequately trained personnel.

The few large experimental facilities for basic ecological research existing at present are associated with a very few universities and with several of the Atomic Energy Commission installations. Three types of facility now operating that might serve as models of arrangements which would be feasible in the near future are: (1) a facility completely administered and supported by a government agency; (2) a facility organized and operated by a single university, with all senior research personnel being university faculty members, but with financial support from Government agencies and/or industrial contractors, as well as by the university itself; and (3) a facility operated by a group of universities. While there are many advantages to each arrangement, a strong association between facilities and universities is highly desirable to insure freedom of research and to promote training at both the predoctoral and postdoctoral levels, where such training is now inadequate (see item 2).

4. Field stations devoted to a broad spectrum of biological study (not to be confused with the specialized environmental research facilities discussed in paragraph 3) need to be increased in number in some geographical regions and especially in quality. The field station provides one of the most effective devices for stimulating interest among students in environmental problems. There should be major teaching and research field stations in each major ecological region or "biome" such as tundra, northern coniferous forest, temperate deciduous forest, tropical forest, temperate grassland, tropical grassland, chaparral, montane, freshwater and marine situation, etc. Many such stations should operate the year around, not just in the summer.

At present, the number of marine stations along the U.S. coast is adequate that many stations are inadequately staffed and badly need financial support. Terrestrial and freshwater stations are far too few in number, and too many of the few which now exist operate only in the summer, and are inadequately staffed or equipped or both.

It is especially recommended that field stations seek funds for immediate purchase or lease of large areas of land and waters surrounding the field station adequate of long range field research. Otherwise, stations will find themselves without any environment to study as a result of population pressure or pollu-