Education, with John Millett as its executive director, made a major contribution to the debate in the early 1950's over the needs and policies of higher education.

It would be difficult to summarize the material Henry includes in this volume. It is distilled greatly in his essay, and his spare and dispassionate style of writing does not lend itself to further condensation. The flavor of his treatment of the Cold War and the period of McCarthyism will irritate some. He is altogether too neutral at times, too dispassionate in his description of events and their effects on higher education and academic freedom. Yet his intent is to show the constantly changing picture of enrollments, finance, political pressures, and resilience of institutions, rather than to deal with the social issues and the substantive nature of the forces that produced the instabilities. His calm treatment is unnerving at times, but it also serves a valid purpose.

We are taken through the "tidal wave" of enrollments, in which the number of students in our colleges and universities tripled in the 15-year period from 1955 to 1970. And we see that the growth that occurred could hardly be described as affluence, in view of how rarely it was possible to expand resources and facilities fast enough to meet the demand.

Henry provides us with a brief and remarkably good summary of changing federal policy during this period. With the G.I. Bill, the establishment of the National Science Foundation, and the National Defense Education Act of 1958 and subsequent legislation, there was a clear recognition that higher education had to become a national concern. Most of us welcomed the new concern. We were not prepared for the recent drastic changes in commitment and funding that now contribute to a "new depression" in higher education.

This "new depression," the loss of public confidence in the importance of supporting higher education, forms the climax of Henry's essay. One need not recite the list of factors that have led us to this situation. Obviously, disenchantment with the "Establishment" is one. Big government is mistrusted and higher education has been linked with big government in too many ways to escape the mistrust. In the 1960's it was the vogue to expect government and universities to solve social problems—to participate directly in social action, to engage in social engineering. Higher education must accept blame for its immodesty in that period. Certainly part of the current disenchantment flows from the false expectations that were encouraged.

That the priority attached to higher education by the public has been lowered is without question. The politics of higher education these days is a crucial subject as a result of this reordering of priorities. Henry summarizes the problem this way:

> Perhaps too much has been expected of faculties and graduates, or at least too much too soon. Perplexing problems remain, in spite of new knowledge and enlarged educational opportunity. Issues of war and peace, economic stability, and changing values create new anxieties. In identifying its programs with current urgencies, perhaps higher education has unwittingly encouraged false expectations. The linkages are real enough—to space science, race relations, urban affairs, ecology, energy, world food supply, better schools, the administration of justice, and others. But the time frame and the nature of the interactions have not always been made clear, nor has the fundamental mission of higher education—teaching, learning, inquiring, and applying knowledge—been meaningfully translated in human terms.

Henry is justifiably proud of the capability of colleges and universities to adapt. But he is not unmindful of the undesirable aspects of such adaptability. He notes that education has responded to the manpower demands of a technical age but that it is quite another question whether the education of the individual has improved or whether personal values have been strengthened. There are still those who cry out against unresponsive institutions, but one might question whether we have been too responsive, and in the process been diverted from our more basic responsibilities and purposes. As Henry points out, "The debate should be on how to best advance purpose rather than change; much confusion arises because we tend to debate change instead of purpose."

This is an intelligent portrayal of higher education during a vital 45 years in American life. It illustrates only too well the influences of the external environment on the health of our colleges and universities. The interdependence of society and higher education is obvious.

Henry is a wise and experienced man, one who could help us to plan for the future and to avoid repeating past mistakes. In this historical essay he does not offer such advice. Yet the essay sheds light on what we are now experiencing in higher education, and gives one much to think about.

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Interferon

Effects of Interferon on Cells, Viruses and the Immune System. Proceedings of a meeting, Oeiras, Portugal, Sept. 1973. A. GERALDES, Ed. Academic Press, New York, 1975. xxiv, 662 pp., illus. $31.75.

This book, the proceedings of an international meeting held at the Gulbenkian Institute of Science, includes 42 papers by investigators from many countries. The 53 active participants included many of the leading authorities in interferon research as well as a number of new authors, who added freshness.

The papers cover the following major topics: Cell Hybrids and Uptake of Interferon; Interferon Induction, Mechanism and Its Regulation; Interferon Action at the Cellular Level; Antagonists; Interactions with the Immune System; Non-antiviral Effects at the Cellular Level; and Mechanism of Action at the Molecular Level. A section headed Miscellaneous includes studies on the antiviral effects of double-stranded RNA and purification of interferon by antibody affinity chromatography. The discussions that followed each paper are included, which gives the reader the opportunity to benefit from the interesting exchanges of the participants.

Other than the fact that it required two years to publish it, I found no major shortcomings in the book. In addition to the expected papers on interferon induction, regulation, action, and genetic control, the book includes seven papers on the interaction of interferon with the immune system and six papers on other non-antiviral effects at the cellular level. In fact, the coverage of these topics occupies more than a fourth of the book and demonstrates a fascinating new orientation in interferon research. The penultimate paper, by Paucher, Berg, and Ogburn on the purification of interferon, is especially important with respect to the interpretation of some of the controversial nonviral properties of interferon. The authors point out that it becomes increasingly important to be sure that one is in fact describing an effect of interferon and not an effect of one of the many contaminants present in most interferon preparations. On the other hand, it should be pointed out that if these other effects are due to "contaminants," their further characterization will become increasingly important because the contaminants also seem to be induced substances that play important roles in cell function.

The book can be highly recommended

to virologists, immunologists, biochemists, and cell biologists. Immunologists and cell biologists should be particularly interested in the expanding new aspects of interferon research on immune reactions and other cell function.

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Effects of Light-Dark Cycles

Photoperiodism in Plants. DAPHNE VINCE-PRUE. McGraw-Hill, New York, 1975. xiv, 444 pp., illus. $30. European Plant Biology Series.

In many plants the onset of important developmental events such as flowering, dormancy, and tuber formation is regulated by the length of the day, or, more accurately, by the relative length of the periods of light and uninterrupted dark. Changes in photoperiod length serve as the most reliable indicator of the progression of the seasons. The ability to measure light-dark cycles, therefore, enables plants to mature and reproduce when environmental conditions are most likely to be favorable and to prepare in advance for seasonal changes in temperature and rainfall that might otherwise be hazardous.

Plants vary considerably in their responses to light-dark cycles. Floral initiation may be promoted by short days, long days, an appropriate sequence of long and short days, or low temperature (vernalization) followed by an appropriate photoperiod. Some plants remain vegetative indefinitely unless they are exposed to one favorable photoperiod, which permits flowering ever after; others flower more profusely if the photoperiod is appropriate, but the effect is quantitative rather than qualitative. The literature on these phenomena is extensive, complex, and often contradictory, and synthesis of the data to yield accurate generalizations is a formidable challenge. Vince-Prue has not only succeeded in this task but has also provided incisive, original interpretations of much of the material.

Time measurement in plants is regulated by the interaction of light absorbed by the pigment phytochrome with an internal oscillator, also called the biological clock. Although the molecular mechanisms of clock and phytochrome action have not been elucidated, Vince-Prue brings the reader up to date with good summaries of current knowledge about both and their relationship to photoperiodism. Other topics covered in detail include the relationships between temperature and photoperiod, with special emphasis on vernalization, and the role of plant hormones and other growth regulators. Whether a unique floral hormone "florigen" exists or whether floral evocation depends upon an appropriate ratio or temporal sequence of several different hormones and inhibitors has been debated by numerous investigators. Vince-Prue brings new insight to this problem by comparing biochemical control of floral initiation with control of other photoperiod-sensitive events.

Current knowledge of photoperiodism is based primarily on studies of the induction and development of reproductive structures, and three-quarters of the book is devoted to these topics. The many other developmental processes regulated by photoperiod are not excluded, however. Induction of dormancy, the development of bulbs, tubers, and other storage organs, leaf and stem growth, root and bud production, branching patterns, vegetative reproduction, and seed germination—all are fully discussed. Such depth and breadth of coverage combined with clarity of writing style and an extensive bibliography should make this book an invaluable resource for developmental biologists investigating regulatory mechanisms. Horticulturists attempting to increase productivity by manipulating photoperiod will find the tabular data on photoperiodic requirements of specific plants particularly useful. The book should also appeal to nonspecialists interested in the numerous ways in which plant development is coordinated with latitudinal variations in habitat, and its usefulness for all readers is enhanced by its attractive layout, typography, and illustrations.

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Plant Phylogenesis

Palaeobiology of Angiosperm Origins. Problems of Mesozoic Seed-Plant Evolution. NORMAN F. HUGHES. Cambridge University Press, New York, 1976. viii, 242 pp., illus. $21.50. Cambridge Earth Science Series.

This book takes a thought-provoking approach to the problems of the origin of angiosperms and their early evolution. Hughes provides excellent background discussions of such matters as preservation, stratigraphy, and Cretaceous faunas (and their possible relation to the early evolution of the angiosperms). These discussions can be recommended highly to neobotanists, who may have little understanding of the problems inherent in paleobotanical work. Neither the neobotanist nor the geologist need be deterred from reading the book by unfamiliar vocabulary; Hughes has appended an excellent glossary of geological and botanical terms.

One of the major contributions of the book is the analysis (accompanied by excellent illustrations) of known Mesozoic gymnospermous groups, particularly their possible relations to the ancestry of the angiosperms. To have in one place such a wide range of information is invaluable. Hughes also examines in detail the earliest known fossils that have angiospermous characters, as well as even earlier fossils of putative angiosperm affinity. Such analyses more than justify the publication of the book.

The reader may be occasionally misled by some oversights in the documentation of statements made. For example, on p. 138 Hughes states that certain genera and species of angiosperms from the Patuxent Formation were named by Fontaine (1889) and proceeds to list the binomials; in fact, the binomials listed are those recognized by Berry (1911; a paper cited elsewhere by Hughes), and Berry's nomenclatorial treatment of the Patuxent flora differs considerably from Fontaine's. This passage is also inconsistent with figure 5.6, in which we are informed that the Patuxent Formation lacks angiosperms. Such lapses are fortunately rare, and the analyses of early angiosperm floras are generally well documented and internally consistent.

Hughes proceeds to denounce traditional methods of analysis of morphological attributes of plants, living and fossil. He would disregard hypotheses derived from comparative morphologic studies of extant plants in developing a theory of angiosperm origin and early diversification. At the same time, he champions comparative morphologic studies based only on fossils. Nowhere does he acknowledge that studies of early angiospermous fossils offer strong support for the "ranalean" theory of angiosperm origin, which was based solely on studies of extant plants. Although Hughes is right that many attempts to explain angiosperm origin and early diversification—whether based on paleobotanical or on neobotanical evidence—have produced little information of value, these attempts have been based on misapplication of traditional methods and their fail-