going to the producers of raw material in the "benefits of trade." Regarding the prospect of such a set of controls, one need only point to the current American farm program or to past experience with international controls. Emile Benoit reviews men's fears and hopes respecting the probable response of the American and the international economy to disarmament and coexistence as well as to anti-Western behavior subsequent to disarmament. The economic advantages appear to be very great, but it is not likely that they will be realized in this century.

This book prompts three reactions. First, it is very useful to diffuse a world point of view, because it has a salutary impact upon international relations. Second, just as a cathedral can be built only of stable units, so a persisting world-structure can be built only of stable states, to which description many "sovereign" lands do not yet answer; such a structure probably will flow out of benefit-increasing exchanges in greater measure than out of a consensus of any sort. Third, what is said of increasing divergence is sometimes imprecise. Suppose per capita income in country A is greater than that in country B, though increasing less rapidly. The ratio of the former to the latter will steadily shrink, but the absolute spread may long increase if the initial ratio is high.

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Plant Viruses

Plant Virology. M. K. Corbett and H. D. Sisler, Eds. University of Florida Press, Gainesville, 1964. xviii + 527 pp. Illus. $12.50.

This volume is based on a series of lectures delivered by various investigators as part of a Southern Regional Graduate Summer Session in Plant Virology; the sessions were held at the University of Maryland in 1963, under the sponsorship of the National Science Foundation. The first half of the course was concerned with "classical" (that is, biological) aspects of plant virology, and the corresponding section of the book is made up of a series of rather complete, accurate, and objective treatments of subjects such as symptomology, transmission, and bioassay.

The lectures comprising the second, or "molecular," half of the course were much more variable. Virus purification is described in cookbook fashion; the article might be a useful laboratory manual, but is not likely to cause many students to ponder the striking fact that plant viruses are so much easier to purify than normal plant proteins. A brief article summarizes serological techniques; it closes with a comment regarding the importance of serology in determining virus relationships, but the fascinating data on serological relationships are not otherwise discussed. A very brief and rather incomplete article discusses electron microscopy of plant viruses. It is followed by a very elaborate effort to apply the rigorous principles of crystallography to the shapes of virus particles. Less rigorous is the treatment of the dynamics of virus synthesis. In one place the author states (correctly) with respect to TMV (tobacco mosaic virus) that "the assembly of protein subunits and RNA chains in the infected cell cannot be directly observed." Elsewhere in the same article is the assertion that TMV provides "one of the clearest examples" of this assembly system because the process "has been reproduced *in-vitro*."

An article on the biochemistry of virus composition provides a useful summary of observations on the amino acid and nucleotide composition of certain viruses. Less useful to the unsuspecting student is the uncritical application of current concepts of molecular genetics to plant viruses. Thus, the term *cistron* is used to define protein-determining nucleotide sequences in the RNA of plant viruses; however, *cistron* is a unit of complementation, a process unknown in plant viruses.

The tendency to burden the data of plant virology with concepts and conclusions derived largely from in vitro investigations of *Escherichia coli* is especially evident in an article on the biochemistry of virus infection. Here, the subject of the synthesis of normal plant proteins is treated by a description of the well-known generalizations about protein synthesis in ribosome systems, but the student is then informed that there is no clear evidence that this system operates in higher plants. The next section describes "synthesis of TMV protein using TMV-RNA as messenger," in an in vitro *E. coli* system, but fails to note that the relevant conclusions have been disclaimed by the investigators themselves. A striking failure to cite rather extensive contrary evidence permits the author to assert that TMV biosynthesis involves early synthesis of virus RNA, followed by rapid synthesis of virus protein and assembly of protein subunits around preformed RNA fibers.

A very long article on the "molecular taxonomy" of viruses is so encumbered with unnecessary theoretical generalizations that the inherent interest of the data under discussion is obscured. The author states a series of "molecular laws" (the familiar DNA-RNA-protein scheme) and asserts that "Molecular taxonomy accepts these laws as being universal [if they are, we shall eventually find out]. . . ." This article is not noteworthy for its objectivity, the following sentence being typical: "Although molecular taxonomy has already taken giant strides, its future is more glorious than its past."

Two articles, by Bawden and Lauffer respectively, counteract, to some degree, the overconfidence that speaks of the future in the present tense. Unfortunately there was apparently no way to bring the high standards of scientific discourse of these two contributors to bear on the utterances of some of their colleagues. Thus, Lauffer's criteria for associating infectivity with a specific component, would, if applied to "infectious RNA," invalidate a number of conclusions and appended theoretical generalizations made elsewhere in the volume. Application of Bawden's suggestion that it would be wiser "to speculate on the likelihood that current hypotheses are wrong, than to try to adapt them to accommodate awkward facts" would have considerably reduced the length and much improved the usefulness of the molecular section of this book.

In their preface to this volume, the editors express the hope that it will "provide a stimulus for students to continue in the search for knowledge rather than to accept dogma." If this book does provide such a stimulus, it is not likely to be by example.

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