and experimental populations with regard to social factors in reproduction. In view of the many variables, the author's organizational feat is impressive. Attention is drawn to experimental studies where uncontrolled variables may be significant and where the experimental conditions may have little relevance to normal social conditions in the wild. His failure to include sample sizes along with percentage comparisons reduces the value of some of the data. A glossary or index of common names would also have been helpful to nonmammalogists.

A book on the ecology of reproduction in mammals will appeal to a wide variety of scientists. Whether they are concerned about proliferating swarms of humans and the effects of their density or are bent on breeding beef or reducing the growth of rodent populations, this compendium of research will be useful. Its pages are filled with tables and figures. Obviously, the subject is complicated and only a beginning has been made, but Sadleir has pointed clearly to the gaps. A comparison with similar, recent studies of birds will be fruitful.

Our ignorance of the control of reproduction in wild ungulates is quite astounding in view of their importance as converters of plants into high-quality protein. Recent experiments on African ungulates have demonstrated their higher reproductive rate as well as superior physiological and behavioral adaptations under tropical conditions as compared with domestic cattle. The livestock at present used by Western man were chosen some 6000 years ago. Are these the most appropriate for all of man's varied ecosystems?

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Hosts and Pathogens

Disease Resistance in Plants. J. E. VAN DER PLANK. Academic Press, New York, 1968. xiv + 210 pp., illus. $9.50.

Plant Diseases and Their Chemical Control. E. EVANS. Blackwell Scientific Publications, Oxford, 1968 (U.S. distributor, Davis, Philadelphia). xvi + 288 pp., illus. $12.25.

In *Disease Resistance in Plants* Van der Plank presents many original ideas in a precise, lucid, and readable style, and in a well-organized and logical sequence. In 1963, the author published a book on epidemics of plant disease and their control. The present volume flows naturally from that work. The maintenance of disease-resistant crops is a continuing process. Fungal and bacterial pathogens, when exposed to resistant hosts, evolve races that can overcome the resistance. Van der Plank contrasts two kinds of resistance: vertical, which is based on a few specific genes, and horizontal, which is based on many, the action of which may be indirect. When a vertically resistant variety is attacked in nature, the appearance of disease in the crop is delayed, but, once disease is evident, the pace of attack is not diminished. Characteristically, when horizontal resistance is involved, the pace of the epidemic is reduced. The author illustrates how different varieties of host plants may possess both types of resistance, only one, or neither and discusses how the characteristics of an epidemic differ in each situation. In overcoming host resistance, an evolving pathogen must simultaneously develop contrasting characteristics of aggressiveness toward a susceptible host, depending upon whether the resistance of a host evoking this response is of the vertical or horizontal type. Van der Plank argues that control of obligate parasites, such as the rusts, by vertical resistance requires at least two genotypes of the host in the area under the influence of the pathogen.

Of the two types, vertical resistance is the better known, but the useful life of vertically resistant varieties has generally been short. Horizontal resistance is less dramatic; such plants are often disease-tolerant, rather than hypersensitive, and crops may successfully survive epidemic-favoring conditions. Because horizontal resistance has been less sought, Van der Plank reasons that potentialities for improvement in this type of resistance may be very great. The useful life of varieties with horizontal resistance is likely to be long.

Considering the book as a whole, one notes that the evidence presented in support of the arguments is drawn from relatively few diseases, but they are ones that have been extensively studied, and as a result the examples of principles are the more convincing. By presenting the argument in terms of epidemics and the potential of pathogens to evolve readily when confronted by resistant hosts the author always directs the reader's attention to real situations, however much theory is behind the reasoning. The outlook of the book is one of synthesis and is constructive. It will create improved understanding of disease resistance and stimulate research in the area for years to come.

Evans's book covers physical, chemical, and biological aspects of chemical control of plant disease and is intended as a general introduction. The approach is uniquely broad and will serve well to orient the beginning student who wants an overview free of exhaustive detail. The author presents concepts clearly, with a minimum of technical jargon, while citing evidence adequately to support his presentation. Particularly worthwhile are his discussions of potentialities for control in such contrasting situations as treatment of seed, soil, and foliage and of the limitations on control of foliar diseases when fungicidal sprays are serially applied to combat aerial pathogens.

The broad approach he takes requires the author to generalize concepts. The danger in such an approach to a large and detailed subject lies in the resulting oversimplification. As a result the beginner may believe his understanding to be more comprehensive than is warranted. The experienced worker will be stimulated by this book. He will want to qualify some of the statements, contest others, and introduce a few concepts. He may even be moved to test some of the ideas experimentally. To paraphrase Alice—what is the use of a book that is not stimulating?

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The Biological Clock

Rhythmic Phenomena in Plants. B. M. SWEENEY. Academic Press, New York, 1969. x + 148 pp., illus. $7. Experimental Botany, vol. 3.

Although rhythmic phenomena have been studied for many years, it is only within the past two decades that rhythmicity has been explicitly viewed as a biological regulatory system. The notion that this regulation involves time, that is, that the temporal order and magnitude of biochemical and physiological processes are controlled by an endogenous and rather accurate bio-