and of its journal *Phytopathology* makes interesting reading. The Society, which began with a subscription of 50 cents and 130 charter members, is now nearly 2,000 strong. Its originator, C. L. Shear, was the first secretary-treasurer and L. R. Jones the first president. The book is very good value for money.

In the "Treatise" the diseased plant is the important object and the pathogen takes second place. Indeed, it is relegated to a second volume which will focus attention on the pathogen, on techniques inhibiting it, and on pathogenicity, while the third volume will cover the public health aspects of the subject, including disease epidemics and their control. In this first volume there are a few introductory chapters on the history of plant pathology, its relationship to other scientific disciplines, and losses caused by disease, but the text is largely devoted to the suffering plant, to pathological processes, defence mechanisms, predisposition and therapy. As the editors make clear in their prologue the main theme revolves round the pathological processes, and it is on these processes that diseases must be classified. Thus we read about tissue being disintegrated instead of about necrosis; about growth being affected rather than morbid anatomy; and about water deficiencies rather than wilts; but the result is not always very different from what one is used to. The general standard of the text is high, though rather diffuse in places. Nearly half of it was written in the United States, but there are five contributions from Europe and Asia, with the promise of substantial British participation in the two volumes still to be published.

W. C. MOORE

MYCORRHIZA

The Biology of Mycorrhiza

By Dr. J. L. Harley. (Plant Science Monographs.) Pp. xiv+234+11 plates. (London: Leonard Hill (Books), Ltd., 1959.) 55s. net.

THIS publication is an important event in the progress of research on mycorrhiza. Dr. Harley provides us with a clear account of what is known in this field (hitherto notorious for its confusion) and shows also where the considerable gaps in our knowledge lie. It will be surprising and disappointing if this stimulating monograph does not benefit both the quantity and quality of future research on mycorrhiza.

It is about eighty years since Frank first noted the widespread association of root and fungus which he termed 'mycorrhiza'. Since then a great deal of work and thought has been given to these organisms, but perhaps without commensurate increase in understanding. Difficulties are obvious: the structures are hidden in the soil; the small scale, especially of some of the fungus partners, hinders anatomical study; culture of one partner without the other is often difficult or impossible; and certain appropriate techniques have only recently become available. Apart from such technical difficulties, this complex subject seems to have attracted an excess of sterile hypothesis and slipshod thought.

It is the virtue of Dr. Harley's monograph that it carefully points out these areas of imperfect experimentation and thought (and language: the index includes "Thamniscophysalidophagy, term not used

on page 195"). Having done so, it avoids further treatment of these aspects, and concentrates on the firmer ground, incidentally revealing outstanding problems where research may most usefully be applied. In several fields Dr. Harley has been able to develop arguments that enhance our appreciation of the significance of mycorrhizal phenomena; for example: (1) he has pointed out that all roots growing in soil are inevitably surrounded by and interacting with special local populations of micro-organisms, and that the mycorrhiza is a special case of this general relationship; (2) studies made by Dr. Harley and his students using labelled phosphate and excised beech mycorrhizas enable him to outline the general mechanism by which ions are actively absorbed and accumulated by the fungal sheath and afterwards transferred to the root; (3) by stating the evidence for and against nitrogen fixation by the fungi of ericoid and orchid mycorrhizas, he makes it clear that the widespread acceptance of the hypothesis that these organs fix nitrogen is unjustified.

The literature of mycorrhizas is scattered, since it enters the fields of plant physiology and anatomy, mycology, forestry, and soil science. Some of the publications are not easily available, and a number are in languages that most workers cannot read. Consequently the collection of recently published material in this monograph will be particularly useful to those embarking on research. For students, too, this book is bound to be valuable, though it would have been more attractive and useful to them if the plentiful illustrations promised by the publishers were in fact present. The only anatomical figures are a transverse section and partial longitudinal section of beech mycorrhizas, and three figures of aseptate hyphae and vesicles. This deficiency is only partially alleviated by some plates.

The mycorrhizal condition is not merely an absorbing problem for academic research. It is a condition that is "at least as usual amongst the seed plants as the uninfected state"; and phycomycetous mycorrhiza, of which astonishingly little is known, occur in many important crop plants—date-palms, cocoa, tea, coffee, legumes, cereals, and grasses. If the symbiosis is highly integrated it may be satisfactory, for ecological and agronomic purposes, to treat the dual organism as a single unit; but it is not certain that integration is as complete as this. For applied purposes, therefore, as well as in its own right, mycorrhizal research is needed; and for such research this excellent book will be a stimulus and guide.

J. WARREN WILSON

THE BANANA

Bananas

By N. W. Simmonds. (Tropical Agriculture Series.) Pp. xvi+466+93 photographs. (London: Longmans, Green and Co., Ltd., 1959.) 45s. net.

A VAST amount is now known, and has been written, about many of the major crops. When that crop is an exotic one like the banana, cultivated virtually throughout the tropical belt and also in many sub-tropical regions as a prime source of food and other commodities, then we have indeed an unusually rich and varied subject for the scientific