up now and then in particular localities. Lawrence is able to outline the five major stages in the evolution of the cargo belief in this region and to relate the theological features of each stage to indigenous pagan and to imported Christian doctrines. In his view, this structure of cargo belief is now a principal inhibitor of modernization among native peoples in New Guinea.

Lawrence in conclusion to this carefully documented study has some remarks (pp. 271–73) of relevance not only to the Australian administration of New Guinea, which he directly addresses, but also to Americans involved in the difficult business of combating heresy and introducing social reform in other countries:

> . . . it is useless to pour in 'aid' from air-conditioned offices without going outside to discover and take into account the people's own ideology and their likely reactions to what is being offered them . . . we must acknowledge and respect cargo ideology as a carefully integrated intellectual system which, as has been shown by its persistence over eighty years, is extremely durable.

But Lawrence at last concludes that it is necessary to "attack" the cargo ideology, albeit in a sophisticated way, by introducing "radical change in the economic field." Yet such change is the goal itself; cargo belief is instrumental, either negatively or positively, toward this end. Might it not be wiser, even if more trying, to work with it, to nurture it, to feed it, and to let more highly developed institutions grow from the cargo belief? A manifest aim of the cargo rituals is, in fact, precisely the achievement of "radical change in the economic field," and if the cargo movement does not depend on Western support, it will find that support in other parts of the world. The mere fact that the theology is bizarre does not mean that it cannot support a sophisticated technology and effective social institutions. Japanese political theology has sometimes appeared to be unreasonable, in Western eyes, but it did not inconvenience an extremely successful industrialization process; and today even some Western economists might take issue with Calvinist theology as being a trifle bizarre, yet by encouraging enterprise it contributed to the industrialization of Europe and America.

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Domesticated Plants and Evolution

Essays on Crop Plant Evolution. Sir Joseph Hutchinson, Ed. Cambridge University Press, New York, 1965. viii + 204 pp. Illus. $9.50.

Crop plant evolution is one of the most complex and rewarding fields of study. For many years de Candolle's *Origin of Cultivated Plants* was the only important publication in the field. The reports of Vavilov and his associates in the 1930's, on the kinds of cultivated plants and their wild relatives in many parts of the world, stimulated studies, and much work has since appeared in scattered publications. These essays, based on a series of lectures, summarize the recent research on origins and evolution of some important crop plants.

In the first chapter H. Godwin explains how pollen analysis provides evidence for prehistoric changes caused by man in the natural vegetation. Such evidence indicates that agriculture reached northwestern Europe about 3000 B.C., some 4000 years after it was practiced in Iraq and Iran.

Summaries of the archeological, cytological, genetical, and taxonomic evidence on the evolution of maize, wheat, barley, oats, rye, sorghum, potatoes, and forage crops condense essential data and studies on their evolution. Although the patterns of evolution differ, some striking similarities are revealed. Man's care and transport of cultivated plants and the continuing contact between crop plants and their wild relatives are shown to be important in the development of most of our domesticates.

Most food crops have been cultivated for centuries, but, with few exceptions, the deliberate cultivation of forage grasses and legumes has developed in comparatively recent historic times. J. C. Cooper has assembled data to show how these plants evolved under human selection, and he suggests how breeding might continue.

In the concluding chapter Hutchinson, the editor, points out that the rate of change in domesticated plants is greater than in any other group of plants. The vast resources of wild and cultivated plant materials we now have are material for changes "as great and significant for human welfare as those that have occurred in the past. Our limitations are the limitations of our scientific insight and imagination, rather than of the biological material with which we work."

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University Reviews in Biology Series: Biochemistry

The Metabolism of Insects. Darcy Gilmour. Freeman, San Francisco, Calif., 1965. xii + 195 pp. Illus. Paper, $2.50.

Just as the tiniest insect contains within itself, in perfect proportion, all of its essential organ systems, so this small and convenient book has packed within it, in well-balanced fashion, all the facts and hypotheses essential to present-day understanding of insect metabolism.

The book opens with a thorough discussion of energy metabolism, the first chapter being devoted to mechanisms of energy production, and the second, to those of energy utilization. These first two chapters set the tone of the entire work, which, while emphasizing the fundamental principle of biochemical unity, points out the fascinating biochemical diversity found among the insects. Thus, the wing muscles of insects that are capable of exceptionally rapid, vigorous flight are provided with giant mitochondria having a particularly efficient system for energy production. There follow chapters on carbohydrate and lipid metabolism; the metabolism of insecticides; the metabolism of amino acids; of purines, nucleic acids, pterins, and pyrroles; and of proteins; the final chapter is an up-to-date discussion of the control of metabolism. The chapter on lipid metabolism includes a most interesting section on hydrocarbons with special functions: the pheromones, those remarkable odors of communication, and the various defensive and aggressive secretions. The chapter on insecticides and their mode of action is of considerable general significance.