

products worth no less than £350 million are produced annually on British farms. This forms about one-third of the total agricultural output and represents almost twice as much milk as was produced for sale in 1935, or is produced at the present time in such major dairying countries as Denmark, the Netherlands and New Zealand. Further, the annual increase in milk production has also been considerably more rapid than in most other dairying countries.

From the economic structure of the industry we pass to milk production on the farm and the astonishing changes which have taken place since 1935 in the national herd, in milk recording, in artificial insemination, in the feeding and management of cows and in the design and use of cowsheds and milking machines. Nor are the advisory services, the necessary milk regulations and the means of controlling milk quality overlooked.

About two-thirds of the book is devoted to dairying in its narrower sense, to milk collection, transport and reception, to pasteurization, sterilization and bottling of milk, with all the machinery these involve to-day, to some essentially British aspects of milk distribution and to the control of milk quality at every stage. Naturally we find also an account of the development of a highly efficient dairy technology from the traditional farm-house manufacture of cream, butter and cheese.

The book concludes with chapters describing the training of young people for the dairy industry and outlining the work now in progress at the main centres of research. For readers who find here a new or wider interest in dairying—and they will certainly number more than the overseas Congress visitors at whom the book was modestly aimed—there is a useful list of general information. This provides a ready means of following any topic in greater detail. There is also an abundance of good illustrations ranging appropriately from attractive coloured drawings of the breeds of dairy cattle to most appetizing pictures in beautiful colour of the industry's greatest triumph, British territorial cheeses at their best.

C. C. BALCH

## CENTRAL AFRICAN SAVANNAHS

### Les Savanes de l'Afrique Centrale

Essai sur la Physionomie, la Structure et le Dynamisme des Formations Végétales Ligneuses des Régions Sèches de la République Centrafricaine. Par Roger Sillans. (Encyclopédie Biologique, Tome 55.) Pp. xv+424+2 planches. (Paris: Éditions Paul Lechevalier, 1959.) 16,000 francs.

**I**N spite of the wider geographical implications of the title, this book relates directly only to the territory of Oubangui-Chari, which with the Cameroons and Moyen Congo to its west, and the Sudan to its east, is, from its central position in tropical Africa, of more than usual importance for considering questions of plant-geography. Based on a doctoral thesis by R. Sillans, it is primarily a record of personal observation and study of the savannahs of that part of Africa, and more especially of their woody vegetation.

The contents of this book follow an arrangement not unusual in studies such as these, with descriptions of climate, geography, geology and soils, and a general account of the ecological classification of the vegetation of Oubangui-Chari, followed by a dis-

ussion of the methods employed by the author and some of the terms used. After this preliminary matter there is a much more detailed account of the savannah vegetation, together with a floristic list of the known woody species.

The territory shows a range of vegetation from lowland rain-forest to woodland and savannah, spread over a rather uniform topography, and accompanied by gradual climatic changes. As the author suggests, there are no natural frontiers to the territory. In all, some 3,600 species occur, among which are a number of endemics of which the author gives a list. This, however, needs some revision: for example, *Cola gigantea* is not endemic, and the remarkable Bignoniaceous genus *Tisserantodendron* occurs also in the Cameroons. The author also attempts to give a biological spectrum of the flora.

That part of the work of most general interest deals with the author's conclusions about how the vegetation has evolved. He maintains that the original covering of forest or woodland has been and is still being destroyed by means of clearing for the purpose of subsequent cultivation. Repeated through the centuries, this clearing, accompanied by partial or complete felling and by firing of the resultant debris, has entailed modifications in vegetation, species, soil and, perhaps, climate. The forest is replaced by tall grassland with more or less scattered trees, which may itself develop into savannah-woodland and ultimately, perhaps, again into forest. The savannahs of Oubangui-Chari in fact represent, according to the author, various stages in seral regeneration following cultivation.

Now, according to Sillans, the original regression of the forest is in no way due to bush-fires; not until cultivation has resulted in the establishment of grassland can they enter. He considers that their destructive effect has been over-estimated, and that they do not normally prevent a gradual re-development of savannah woodland into forest. No evidence of real adaptation of plants to a permanent régime of fires is regarded by him as proved; but there is an interesting account of nanism and the 'suffruticose' habit being induced in a species of *Bridelia* through repeated cutting in connexion with cultivation.

The problems of the age and origin of bush-fires and their effect on the savannah vegetation of tropical Africa are still most disputed; in fact Prof. J.-L. Trochain, in a preface to the book, combats some of M. Sillans's views. The ultimate solutions are, however, brought nearer by the important evidence presented in this work. I am, however, appalled by its price of 16,000 francs. J. P. M. BRENAN

## UNSTEADY SUPERSONIC FLOW

The Potential Theory of Unsteady Supersonic Flow  
By Prof. John W. Miles. (Cambridge Monographs on Mechanics and Applied Mathematics.) Pp. xii+220. (Cambridge: At the University Press, 1959.) 45s. net.

**T**HE aerodynamic theory of unsteady flows is mainly concerned with questions of the following type: If a wing or body, moving forward with constant speed, has a prescribed transverse motion about its rectilinear mean path, what are the resulting forces and moments? During the golden age of the linearized theory of compressible flow (1945-55 approximately), when it was permissible to assume