creep into experiments; indeed, this is a book which no research worker on social insects should be without.

The very few misconceptions present in the book probably arise because material for it was collected not later than 1964; thus I do not think that von Frisch would now write that as a rule bees gather either nectar or pollen and only occasionally both at once; nor that swarming is necessarily or primarily associated with a period of superfluity of food.

The book is written in a clear, readily understandable style which is complemented by numerous explanatory diagrams and photographs, many of which have not previously appeared. The publishers are to be congratulated for the clear format and absence of typographical errors and L. E. Chadwick for the most successful translation.

The subject matter has been arranged with a masterful touch, and although there is inevitably some overlap between chapters this is skilfully handled and repetition is kept to the minimum required to complete the picture at hand. Each chapter has a most useful and concise summary. The conclusions are supported by a wealth of examples of experimental results, and in particular recent findings are treated in depth, but even so von Frisch reminds us that in order to be thoroughly convinced of the actual intensity and persistence of a particular behaviour pattern there is no substitute for watching it. Throughout the text he makes suggestions for future work, although experiments required are often by no means easy to devise. In his preface von Frisch reveals that for a long time it had been his intention to write this book, but that he was deterred from doing so by the large gaps in our knowledge. It is quite remarkable that so many of the gaps have been filled by this one man.

J. B. FREE

# TWENTY YEARS OF BEE RESEARCH

## Traité de Biologie de l'Abeille

Edited by Remy Chauvin. 1: Biologie et Physiologie Générales. Pp. xvi+547. 2: Système Nerveux. Comportement et Régulations Sociales. Pp. viii+566. 3: Les Produits de la Ruche. Pp. viii+400. 4: Biologie Appliquée. Pp. viii+434. 5: Histoire Ethnographie et Folklore. Pp. viii+152. (Masson: Paris, 1968.) 578 francs for the 5 volumes.

THIS five-volume treatise has been prepared under the direction of Professor R. Chauvin with a view to making available the results of bee research during the past twenty years. The title refers to the honeybee, not to bees in general, and apart from a chapter on the genus *Apis* and occasional comparative references to other *Apis* species and to other bees, the whole treatise is on *Apis mellifera*.

The quality of production and illustration is outstanding but, even so, the book is very expensive. The five volumes can be purchased separately.

All sections of the treatise will be found interesting, both to those directly concerned with the subject matter and to others working in related fields. The volumes differ from, say, R. A. Grout's *The Hive and the Honeybee* (1963), or A. Büdel and E. Herold's *Biene und Bienenzucht* (1960), in that the emphasis is on the bee, not its exploitation. They are more on the lines of C. R. Ribbands' *The Behaviour and Social Life of Honeybees* (1953), but whereas that book was designed for reference, Chauvin's seems designed to be read rather than consulted: incomprehensibly, for a work of this size and stature, there is no subject index, and in the contents list many of the page numbers are incorrect.

Professor Chauvin is at present in charge of the Laboratoire de Psychophysiologie, Faculté des Sciences, Université de Strasbourg. But from 1949 onwards he built up the Station de Recherches sur l'Abeille et les Insectes Sociaux, at Bures-sur-Yvette near Paris, and he and other scientists working there have written about half the seventy-eight chapters. Many of these chapters describe the authors' work at Bures, most of which was originally published in *Annales de l'Abeille*, *Insectes Sociaux*, and various *Comptes Rendus*. For instance, Dr R. Darchen writes on the production and use of wax by honeybees, Dr P. Lavie on antibiotic substances in the honeybee colony, and Dr J. Louveaux on the collection of pollen by bees. Seven chapters are by Drs J. Lecomte and J. Pain. Lecomte discusses interaction and aggression between bees, their foraging behaviour and pollinating activity. Mlle Pain writes on caste determination and, especially, on pheromones produced by the queen honeybee. (The reason for the French spelling *pherormone* is the phonetic similarity between *pheromone* and *fair aumône*, "to give alms".) Her work at Bures, and that of Dr C. G. Butler in England in the same field, covered roughly the same period, but there has been little interaction between the two. Dr Pain discusses Dr Butler's experiments and conclusions in the second volume (page 203 *et seq.*).

Dr M. Barbier, of the Institut de Biologie Physico-chimique in Paris, who collaborated with the work at Bures on pheromones, etc., has contributed a useful chapter on the biochemistry of the honeybee in the first volume. Professor Chauvin himself has written fifteen chapters, mostly on biological problems of special interest to him, such as the physiological and therapeutic action of hive products (in volume 3), or on subjects not closely related to work at Bures, such as honeybee dances (volume 2). Dr A. Maurizio (Switzerland) and Professor F. Ruttner (Austria and Germany) have each contributed five lucid chapters on their own special fields of research. The first includes the collection and treatment of pollen and nectar by bees, factors affecting the length of life of bees, and the enzymes of the hypopharyngeal glands. The second covers systematics, bee breeding and genetics, and the special features of mating in the honeybee.

Most of the remaining chapters in volumes 1—4 are written by German workers; the rest are contributed by authors of other nationalities, two being British and two American. The fifth volume differs from the others in that it is written not by honeybee specialists but by specialists in other subjects at various French institutions of learning and research who, for the purposes of this book, have delved into the history and folklore of bees. These chapters contain many interesting and little-known details, and serve as a supplement to the classical works of such authors as J. G. Bessler, F. S. Bodenheimer, H. M. Fraser and H. M. Ransome. The volume is in no way comprehensive, but as a finale it adds leaven to the whole.

The contents of this treatise relate largely to research findings in the past two decades. They seem to have their nucleus in the work done at Bures, and then to radiate out to related subjects. The chapters have their own bibliographies; these are good and detailed, although they omit many papers published in English, and each stops short at the year in which the chapter was written, which may be 1963 or earlier. An English or German book with the same title would probably treat the subject more systematically than is done in these volumes, but it might well be less readable.

EVA CRANE

# DEVELOPMENTAL BIOLOGY

## Control Mechanisms in Developmental Processes

Edited by Michael Locke. (26th Symposium of the Society for Developmental Biology, La Jolla, California, June 1967.) Pp. xiv+302. (Academic Press: New York and London, 1967.) 112*s*.

THIS series of symposia was originally published as supplements to the journal *Growth*, but for many years now it has