PREFACE

THE flight of insects has interested zoologists from the earliest times. It is the most obvious of the characteristics which have made this class of animal successful in the colonization of a wide variety of terrestrial environments, and the insect's precision in aerial manoeuvres commands the admiration of the naturalist even in these days when man's conquest of the air is no longer a novelty. To the serious student, however, small size and the speed with which the wings are moved in the more efficient fliers combine to make accurate description of the mechanics of flight a more difficult task than for some of the other types of animal locomotion. It was only with the introduction of photographic and other instrumental aids towards the end of the nineteenth century that a beginning was made with the accumulation of quantitative data which could form the basis on the one hand for aerodynamic theories and on the other for physiological analysis of the properties of muscles and other structures comprising the flight system.

A landmark in the history of the subject was the publication in 1934 of Magnan's book, *Le Vol des Insectes*. The researches summarized in that book have provided the material for the chapters on insect flight in most text-books of entomology in the succeeding twenty years, and are still of great value. But it is impossible to read some of these accounts without being impressed by the apparent isolation of zoological thought of the time from the parallel progress being made in the sciences of aeronautics and comparative physiology. Reports about the speed of flight of certain flies were widely quoted which bore no relation to physical possibility, and theories were propounded in conflict with principles which were fundamental in other fields of study. One of the characteristics of modern biology is the breakdown of the boundaries which separate its subdivisions, and nowhere is this more fruitful than in behavioural studies where mechanics and physiology are integral to a more profound understanding. The new approach is well illustrated by L. E. Chadwick's chapters on insect flight in K. D. Roeder's

Insect Physiology, but progress has been sufficiently rapid since 1953 to justify a fresh review of our state of knowledge.

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