Iceland, Hainan and Formosa. A work on the birds of China was in preparation when he died. He also contributed to *The Ibis, Tori,* and other periodicals.

Hachisuka was educated at Cambridge and acquired western ideas and friends. Jean Delacour, writing in *The Auk,* says that his colleagues retained him in vivid and affectionate remembrance.—C.E.B.

MAJOR H. M. WHITTELL, O.B.E.

Major H. M. Whittell died on February 7, 1954. See biographical account in this part, by Dr. D. L. Serventy.

Review

Mechanics of Bird Flight.—Ever since the days of Icarus the belief has been widely held that in the study of the flight of birds lay the keys to all the problems of human flight. It is a sober fact that, Mitchell (of Spitfire fame) and his seagulls notwithstanding, these problems so far have been solved along lines that have been remarkably independent of ornithology, pure or applied; and now comes Anthony Jack (*Feathered Wings: A Study of the Flight of Birds,* London, Methuen & Co. Ltd., Aust. price 25/-) to turn the tables and use the aeroplane and the principles involved in its operation to lead us to problems of bird flight hitherto unsolved.

This reviewer does not know the background of the author—whether he be airman turned ornithologist or ornithologist turned airman—but the internal evidence of the book shows him to be thoroughly competent in both fields, and, more, he has a faculty for easy exposition and friendly expression that makes this work the best we have seen on the subject.

The straightforward mechanical parallel between the bird's wing and the man-made aerofoil, and between the alula and the aircraft's 'slotted wing' have, of course, been presented and explained many times. Jack opens his book with these explanations, shows with abundant diagrams the development of 'resultant force' from airflow and angle of attack, and then proceeds to analyse and classify the various methods of flight employed by birds—flapless flight (gliding, diving, throwing up, and thermal soaring), and flapping flight, which he subdivides into sculling, hovering, rocketing, and winnowing.

Effects of wind on airspeed and ground speed, comparisons of wing-loadings, meteorology, navigation, and an excellent chapter on the anatomy of the bird's wing complete an excellent book, absorbing by virtue of the new things the author has been able to tell us about the flight of birds, and challenging because of the many problems which he states in direct terms and then confesses that he cannot as yet explain.

One would quarrel, perhaps, with his tentative assumption of the weights of the three flying muscles as an index of strength. Weight per unit length would be preferable as a rough practical index, since the strength of a muscle is directly proportional to its maximum area of cross-section and is independent of length. However, he makes the assumption with an expressed doubt which disarms criticism.

The author quotes a number of Australian birds as well as European and Asiatic species; two opposites of bird flight which he confesses are beyond his comprehension are those of the Albatrosses and of the Australian Grey Fantail.

His excellent notes on the resolving power of the bird's eye, on why a bird cannot get out of breath while it is flying (which is remarkable but true), and a number of other side-issues as well as his main theories, make a book which the bird student should not miss.—P.C.M.

The date of publication was March 29, 1954.