settlement, but they had been mainly domestic. The 1859 consignment included some wild rabbits, and on liberation they multiplied rapidly. By 1886 the rabbits had reached all States in Australia and were proving a pest, mainly by competitive grazing on pastures with sheep and damage to young shoots and trees. This rate of spread was, however, paralleled and surpassed by that of the myxomatosis virus introduced in 1951. Originating in South America, where it was first noted as a disease affecting European rabbits kept in the laboratory, myxomatosis was the main cause of the reduction of the Australian rabbit population in certain areas to 20 per cent of the original numbers by 1955 and made it possible to control the menace. Similar introductions of the disease into France, England and Chile also caused a reduction in rabbit numbers. The choice of the correct strain, whether of rabbits or virus, led to successful spread of the virus, and it is appropriate that two scientists from Australia, where the rabbit problem was urgent and important and its investigation and control given scientific and financial support, should collect published and unpublished results and produce an authoritative work on myxomatosis.

Myxomatosis, which is caused by the myxoma virus, is characterized in the European rabbit, *Oryctolagus cuniculus*, by the mucinous tumours it produces on the skin of infective animals, leading eventually to death. In the American rabbit, *Sylvilagus brasiliensis*, the virus has formed a symbiotic relationship with its host, in which it only causes tumours at the sites of infection. In the book Prof. Fenner and Mr. Ratcliffe cover all aspects of the interaction of virus with the hosts it may affect. The chapters on the behaviour and ecology of rabbits contain many new findings based mainly on investigations carried out on animals kept in enclosures and show that the European rabbit is essentially gregarious with a striving for each individual to be part of a social group. Possibly because the main emphasis was on applied investigations, little has been reported on the fundamental aspects of myxovirus, despite the attractive dust cover, but the behaviour of the virus in tissue culture, its pathogenesis in animal hosts and the development of immunity are extensively covered. Studies in the laboratory and in the field on the transmission of myxovirus show the importance of winged insects, especially mosquitoes, and much basic information is given on the mechanical spread of virus from infected rabbit skin tumours to clean rabbits by way of the mouth-parts of the insect.

Of special interest are the investigations of the virulence of the virus after the initial outbreaks. The virus virulence was reduced from 99 per cent for laboratory rabbits to about 90 per cent. At the same time, there is evidence of genetic resistance developing in European rabbits.

The final chapters deal with the history and evolution of myxomatosis in North and South America, Australia and Europe. It is regrettable that in South America the relationship between myxoma virus and its natural host, *S. brasiliensis*, has not been extensively studied, despite the pioneer work of the late Dr. H. Aragão in Brazil, since it is possible that eventually a similar symbiotic relationship may exist in Europe and Australia between genetically resistant European rabbits and an attenuated myxoma virus. The spread of the virus in Australia and in France was equally rapid due to transmission by mosquitoes. In England it was slower, since transmission was by the rabbit flea. In California, where a different strain of virus is found, European rabbits have been equally at risk. In the Argentine an interesting epidemiological position exists, with European rabbits affected with myxomatosis in the south and American rabbits affected in the north.

The book throughout is interesting and pleasant to read, and contains many informative figures, tables, photographs and maps. Besides providing much information to workers in many disciplines on epidemiological

methods and the hazards of biological control, it also emphasizes how much both of fundamental and applied importance can be discovered as a result of concentration on a practical problem.

R. F. SELLERS

WAYS OF WATERFOWL

Handbook of Waterfowl Behaviour

By Paul A. Johnsgard. Pp. xiv + 378 + 20 plates. (London: Constable and Co., Ltd., 1966.) 75s.

THE coming of the theory of evolution by natural selection resulted sooner or later in a rebirth, or at least a re-orientation, of almost every branch of biology. But although Darwin himself wrote a pioneer book on behaviour, namely, *The Expression of the Emotions in Man and Animals*, the evolutionary way of looking at animal behaviour was slow to develop. Although Darwin's book had a great effect, it was a delayed effect—and it was not, in fact, until the coming of the modern ethnologists that the species-characteristic fixed-action patterns of animals began to be sufficiently well described to use as taxonomic characters. This development represented a new tool that could be used to develop the comparative study of behavioural characters so as to throw new light on the evolution and relationships of species and also of higher categories. Among the pioneers in this field perhaps as many as four-fifths chose to work with birds. This was understandable. The Aves are characterized by the possession of highly elaborate stereotyped species-specific display activities ideal for comparative investigation. Among the groups most intensively studied were the *Anatidae*, the ducks, geese and swans, and the names of Heinroth and Lorenz will always be associated with the ethology of this group. Lorenz, in his classic comparative study of the movements of *Anatidae* (1941), was perhaps the first to show the great promise of this method. But no one man can get far with the inventory, the itemization, of the behaviour patterns found in a big group such as this without having access to a very extensive collection of material maintained under the best possible conditions. Even Lorenz in 1941, great wildfowl fancier though he was, lacked the facilities to carry the investigation beyond a certain point. Modern students of wildfowl behaviour have a unique advantage over all their predecessors. Mr. Peter Scott, by establishing the Wildfowl Trust at Slimbridge in Gloucestershire, and endowing it with the finest collection of waterfowl in the world, has provided research facilities which are unsurpassed. Many ethologists have worked at Slimbridge, but none has done more thorough and intensive work there than Mr. Paul A. Johnsgard of the University of Nebraska. This book gives the conclusions resulting from many years of investigation both at Slimbridge and in the field in many parts of the world. It is a fine piece of work containing detailed descriptions and more than a hundred pages of illustration. It will be indispensable to students of ethology, especially those concerned with bird behaviour.

W. H. THORPE

High Speed Pulse Technology

By Frank B. A. Früngel. Vol. 1: Capacitor Discharges—Magneto-hydrodynamics; X-rays—Ultrasonics. Pp. xiii + 620. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1965.) 192s.

High Speed Pulse Technology is a translation, brought up to date, of the second edition of Dr. Frank Früngel's book in German. The translation is the work of three of his German collaborators, and though the English often falls short of the standards of Fowler, it is adequate.