

SPECIAL REVIEW**Pesticides — How Little We Know**

By Stanley Cramp

Pesticides in the Environment and their effects on Wildlife, The Proceedings of the Advanced Study Institute sponsored by the North Atlantic Treaty Organisation, Monks Wood Experimental Station, England, 1-14 July 1965. The Journal of Applied Ecology, vol. 3 Supplement. June 1966, 70s.

THE last five years have witnessed enormous strides in our understanding of the effects of pesticides on wild life and the beginning of effective measures to control their unwise use. There is a growing realisation that the synthetic chemicals are far from being a final and simple answer to insect problems, whether in agriculture or public health. Yet the gaps in our knowledge are still formidable, and adequate research and controls alike are restricted to a handful of countries mainly in the northern temperate regions, although contamination by now is almost world-wide. Both the progress achieved and the distance still to be travelled are illustrated vividly in this volume.

First, the credit side. When Rachel Carson exploded her bombshell *Silent Spring* in 1962 she was compelled to draw most of her evidence from North American research. Yet, this Advanced Study Institute, the first international gathering of its kind, was able to bring together 71 scientists—chemists, toxicologists, agriculturalists, ecologists, zoologists and so on—of eleven different nationalities. The papers by US scientists in these *Proceedings*, dealing with recent work on toxicology, pen tests, intensive studies into pesticides in whole ecosystems, marine and freshwater pollution and the effects of sub-lethal amounts on behaviour, show clearly that their contribution continues to be of prime importance; but other countries are now playing a key part also. Great Britain, with its network of amateur observers, working mainly through the British Trust for Ornithology, has given the lead in the study of changes in whole populations, first with the peregrine, and later with other birds of prey, and water birds such as the heron and great crested grebe, while more recently the strengthening of the Nature Conservancy Toxic Chemicals and Wildlife Section has led to far-reaching research on soil animals, sea-birds, freshwater systems, and toxicology, and a close and valuable co-operation between their professional scientists and the amateur ornithologists. The Netherlands, too, has a long history of studying bird populations, so that the establishment in 1964 of a unit with facilities for toxicological analyses makes it possible for them to link accurately pesticide use with wildlife changes. The first results suggest that environmental contamination has contributed to declines there in spoonbills and terns. In Sweden

analyses in recent years suggest that agricultural chemicals (especially mercury, which has not so far been under serious suspicion elsewhere) are implicated in the widespread decline of some species. In France, feeding tests have been carried out on game birds, and in Germany, Switzerland and Canada field investigations have been used to assess the immediate effects of spraying programmes.

The papers in this volume describing all this, and other recent work, show convincingly how knowledge is increasing. The debit side, how much we still do not understand, was perhaps brought out most vividly in the keen and lengthy discussions which were a vital part of the Advanced Study Institute's work. As Dr. Norman Moore's excellent assessment of these makes clear, they demonstrated first the almost complete lack of statistics of pesticide use—the basic requirement for any accurate studies. (Though A. H. Strickland deserves our gratitude for his skilful attempts to provide some estimates for England and Wales in recent years.) Secondly, there are many toxicological uncertainties. Not only, for example, is it still not known how DDT kills, but, more important, there was no agreement at Monks Wood on which organs provided the best analytical information, while only a qualified reply can be given as to the significance of most residues found in bodies. Thirdly, we have few reliable estimates of animal populations, their normal range of fluctuation, or the reasons, other than pesticides, for changes in numbers. Fourthly, the great majority of countries, including some with a long and distinguished chemical history, still lack the facilities for determining residues, yet without them it is impossible to *prove* to sceptics that certain pesticides may be causing wildlife damage. Moreover, such tests have been so far mainly confined to organochlorines—and even then some key inquiries have been partly vitiated because the tests did not include all the chemicals in this group—yet it is clear that organo-phosphorous compounds, mercury and other contaminants cannot be ignored. Finally, measures of control are lacking or incomplete over large areas of the world.

Nevertheless, inadequate though our knowledge may still be, certain facts are clear: that contamination is now almost worldwide; that wild animals may be killed outright or suffer sub-lethal effects on reproduction (and, possibly, behaviour), and that populations, especially of species at the end of a food-chain, can be reduced or, as in the peregrine in parts of Britain and over most of eastern North America, become locally extinct. These dangers threaten wherever persistent chemicals are used, in temperate, sub-tropical or tropical regions. And contamination has already spread beyond the area of use, into the Arctic and Antarctic. The scientists rightly press for more knowledge, but they have already provided the evidence for the conservationists to call urgently for wider and fuller controls. Pressures on wildlife all over the world have been steadily increasing; some species may be unable to withstand this final, insidious threat.