

HORMONES VERSUS INSECTS



PEOPLE ARE STARTING TO SPEAK OF THE CONCEPT OF AN INTEGRATED APPROACH, WHICH CONSIDERS THE PLAGUE PHENOMENON IN A BROAD ECOLOGICAL CONTEXT.

XAVIER BELLÉS MEMBER OF THE COUNCIL FOR SCIENTIFIC INVESTIGATION

The problem of controlling insect plagues is, perhaps more than ever, a controversial subject. Almost everybody agrees, however, that we must carry on looking for new methods which can lead to better solutions to the old problems (specificity, persistence) and to those that arise or are repeated as a result of previous actions (contamination, development of resistance in insects).

The undesirable side-effects of DDT, and all the organochlorates developed in the forties, not only came to the attention of the specialists but also influenced public opinion. The publication of *Silent Spring*, by Rachel Carson, was largely responsible for widespread public awareness regarding this problem and, towards the seventies, the use of these compounds was banned in many of the developed countries. At the same time, people started to speak of the concept of an integrated approach, which considers the plague phenomenon in a broad ecological context.

One aspect of this new policy involves the use of substances that affect the insect's hormone systems. So far as exocrine hormones are concerned, it should be remembered that insects have very sophisticated communication systems which use real languages expressed as chemical messages. Sexual feromones are a good example of these systems. Their function is to ensure pair-forming and fertili-

zation. Thus, when when an individual of either sex becomes sexually receptive, it secretes a feromone which attracts individuals exclusively of the opposite sex and the same species, sometimes over considerable distances. The possibilities of using these sexual feromones in plague control are obvious, both for the massive capture of one of the sexes of the species to be controlled and to produce confusing effects which will lead to a drastic reduction in coupling. It must be said that the applied study of insect sexual feromones has gone far beyond the laboratory phase and plays an important part in the framework of the integrated approach. For example, in the control of the processionary moth (*Thaumetopoea pityocampa*), one of the most worrying forest pests of Catalonia and the whole of the Mediterranean, this species's sexual feromones are already being used. They were identified and synthetically produced at the department of biological organic chemistry of the *Centre d'Investigació i Desenvolupament* (C.S.I.C., Barcelona). The results have been satisfactory and encouraging.

With regard to endocrine hormones, the knowledge obtained about the modulating effect the insect's juvenile hormone has on its metamorphosis suggests that this hormone could also be used against the insect itself. Indeed, not only naturally occurring hormones, but also various synthetic imitations have shown an inhi-

bitory effect which usually has lethal end-results. Some of these synthetic products have been put on the market as insecticides, pointing out, as their chief advantages, the small quantities needed, the selectivity in insects, and the negligible environmental impact. Furthermore, during the insect's adult life, the juvenile hormone conditions the growth of the reproductive organs. For this reason, various antagonistic substances have recently been developed from this hormone, which induce sterilizing effects, also useful in pest control.

Finally, it has been shown that the modulation of endocrine activities is ultimately caused by substances produced in the brain. So far, scientists have detected more than fifteen insect cerebral hormones with very varied vital functions. The possibility of intervening in these systems, then, opens up new fields of research.

Endocrine agents are also the object of study at the department of biological organic chemistry, at Barcelona, although the chances of using the results for practical ends do not seem as immediate as in the case of the feromones. All the same, we must follow up every available clue, even those that at present appear too hypothetical to be applied. It would not be surprising if some of those mentioned here were to play an important role in the question of pesticides in the future. ■