

AVERMECTINS: NEW PESTICIDES?

PREFACE

James E. Wright^{1/}

During the past few years, understanding about the physiological and biochemical systems in arthropods has been increasing at a rapid rate. Similarly, with the advancement of knowledge of basic mechanisms, the opportunities for the development of new chemicals with highly specific activities at specific cellular levels have also seen similar advances.

The avermectins are a group of recently discovered chemicals that initially were reported in the parasitology research program at the Merck Sharp & Dohme Research Laboratories to have a unique mode of action against a wide spectrum of nematode and arthropod parasites of animals. Other investigators have provided additional momentum for development of these macrocyclic lactones by pursuing the biochemical mode of action of avermectins, which has been defined as the blocking of neuromuscular transmission of action potentials by the elimination of inhibitory post-synaptic potential; in effect, avermectins were found to be gamma-aminobutyric acid (GABA) inhibitors.

The possibilities of potential regulation of insect behavior based on avermectins' mode of activity in specific pathways is not unlike other materials that have been successfully developed for insecticidal properties. The initial discovery of the activity of the avermectins in the parasitology aspect against nematodes subsequently led to the exploration of their activities as systemics against a variety of arthropods of animals. Particularly, successful studies were accomplished with the cattle grub, sucking lice, ticks, and psoroptic mites.

The definition of bioassays for biological activity remains the most important step for new chemistries in the laboratory. Subsequent field trials based on new bioassays of the physiological effects of the avermectins have identified new insecticidal properties. These recent discoveries evolved through the understanding of the mode of action of avermectins.

Therefore, this symposium was a timely occurrence in which recent results could be presented to provide an up-to-date status report on different fields of investigations of avermectins in the animal area as well as in the environmental area and to introduce investigations in the plant protection area. These reports only represent recent discoveries in the activities of the avermectins and are just a beginning. The results represent new insights into the understanding of regulatory functions that control the behavior of insects and should serve as stepping stones for future research leading eventually to additional control strategies for prevention of economic losses to animals and to plants.

^{1/}Boll Weevil Physiology Research, Boll Weevil Research Laboratory, USDA, ARS, Mississippi State, MS 39762.