TOXICOLOGICAL STUDIES ON THE LARVAE OF CULEX PIPIENS (L.)

BY

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of

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DOCTOR OF PHILOSOPHY

in

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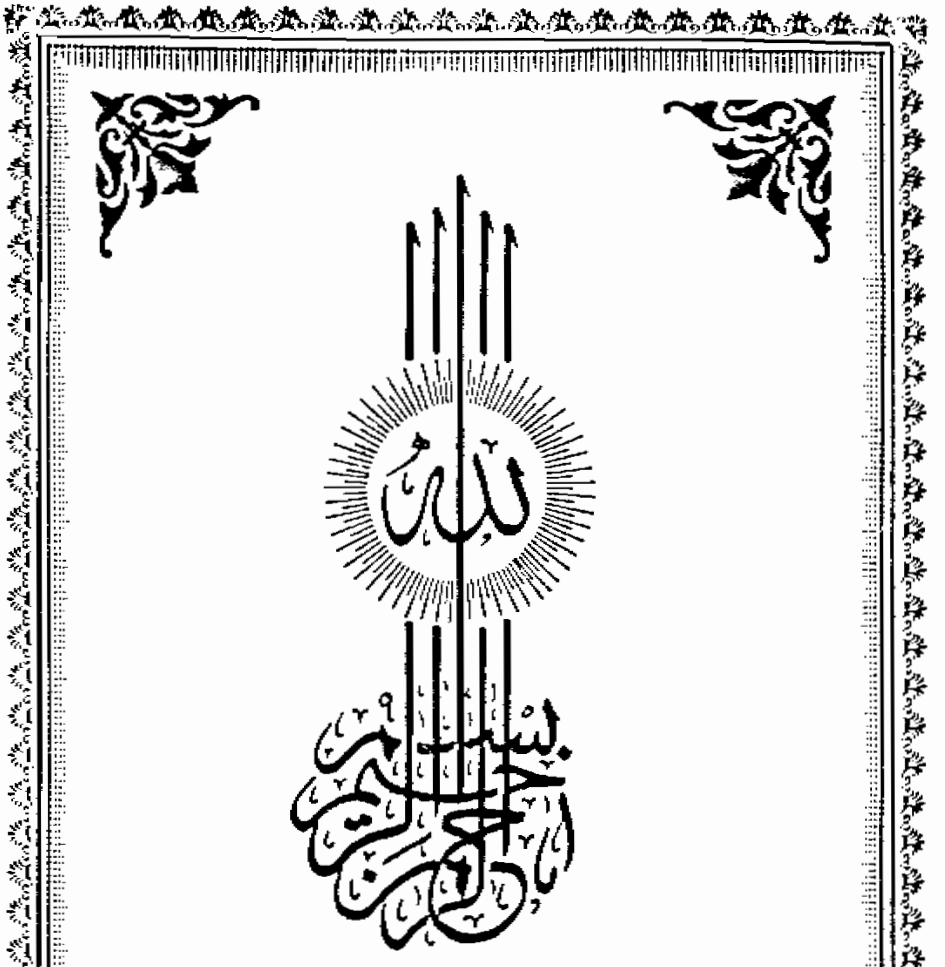

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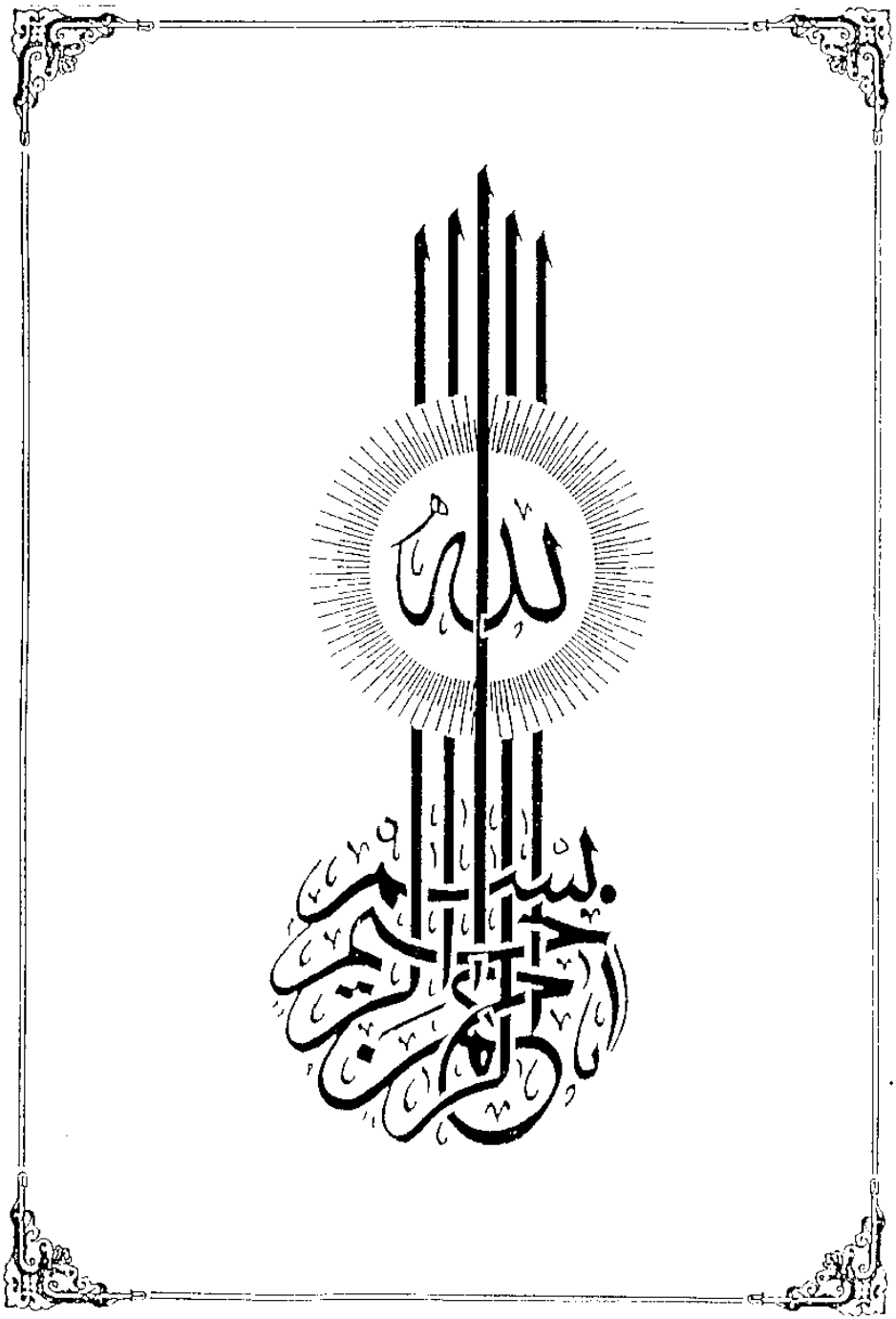

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Approval Sheet

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ABSTRACT

TOXICOLOGICAL STUDIES ON THE LARVAE OF *CULEX PIPIENS* (L.)

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Experiments were conducted to study the development of tolerance or resistance in the Culex pipiens larvae to certain insecticides, i.e. permethrin and malathion. The cross resistance of malathion strain was also studied against chlorpyrifos, sumithrin, sumethion, permethrin and decamethrin. Morever, the correlatlons between the development of resistance to insecticides and the activity of acetylcholinesterase enzyme in the heamolymph of the 4th instar larvae was also studied throughout the course building up resistance in the 5th, 10th, 15th and 20th generations.

The 4th instar larvae of Culex pipiens were selected with LC_{25} of permethrin and malathion for 21 successive generations.

Susceptibility tests were done to measure the limit of suceptibility to both the permethrin and malathion in the control colony in the generations of parent, F_{11} and F_{21}.

Experiments were carried out on a subcolony of the selected strain to study the reversion of malathion resistance in Culex pipiens larvae.

The sensitivity of the 4th instar larvae of malathion resistant strain compared to the parent strain were studied against, chlorpyrifose, sumithion sumethrin, permethrin and decamethrin, 21 generations after selection.

On comparison basis, results of cholinesterase bioassay revealed that differences in activity percentages recorded interstrain were generally, lower in malathion - treated strain, than those in permethrin - strain.

INTRODUCTION

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Mosquitoes casue great suffering and economic loss because of their blood sucking habits. They are vectors of malaria, yellow fever, dengue as well as filariasis, which are considered most, four important diseases of tropical and subtropical parts of the world today.

Since mosquitoes play an important role in the transmission of encephalitis, discomfort and misery by their bites, a great expansion in mosquito control activities has been recorded. Among other genera, culex mosquitoes are increasing in Africa as urbanization provides favourable habitats and sanitary measures are disregarded. Culex mosquitoes are typically feeders on bird blood. They are important vectors of both arboviruses and avian Malaria. On the other hand, Culex pipiens (L.) and Culex fatigans (Weid.), which widely found in Africa, bite man for blood meals. However, under favaruable conditions, such mosquitoes invade houses in large numbers and become a considerable menace.

Furthermore, C. pipiens and C. p. quinquefasciatus may serve as intermediate hosts of the human filarial

worm Wuchereria bancrofti, while C. fatigans is also considered a potential vector of yellow fever.

For an attempt to control such vectors, pesticides have been widely used and extensively produced. Accordingly the large scale use of toxicants against several pests of either agricultural or medical importance, has frequently led to the development of strains of insects resistant to many insecticides which were designed for their eradication. It is in the field of public health that insecticide resistance has become a serious problem.

Trials to study the nature of resistance to organophosphorus and synthetic pyrethroids insecticides in Culex pipiens (L.), the important vector of filariasis and Reft Valley Fever (RVF) in Egypt, was thought to be an essential contribution towards their effective control. The present investigation also attempted to study the resistance spectrum to various insecticides in malathion resistant Culex pipiens larvae aiming to achieve the appropriate chemical afor controlling this insect under field conditions.

In addition, the study of Acetylcholinesterase [AchE] activity in the insect has received special attention since it is thought that it is the target of organophosphorus and carbamate insecticitdes (O'Brien, 1967). It is generally accepted that the toxic effect of organophosphates in insects is due to their ability to inhibit ChE enzyme with subsequent disruption of nervous activity.

The present study was aimed to study the development of resistance in Culex pipiens larvae for both malathion and permethrin insecticides recommended by the world health organization because of their role in mosquito control in public health in Egypt.

To accomplish such goal the following points were studied :

1 - The rate of development of resistance to different recommended organophosphourus and synthetic pyrethroid insecticides.