BIOCHEMICAL STUDIES ON THE INSECTICIDAL EFFECTS ON THE GENERAL METABOLISM OF RATS.

THESIS

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This Thesis Has Not Been Submitted For A Degree At This Or Any Other University.

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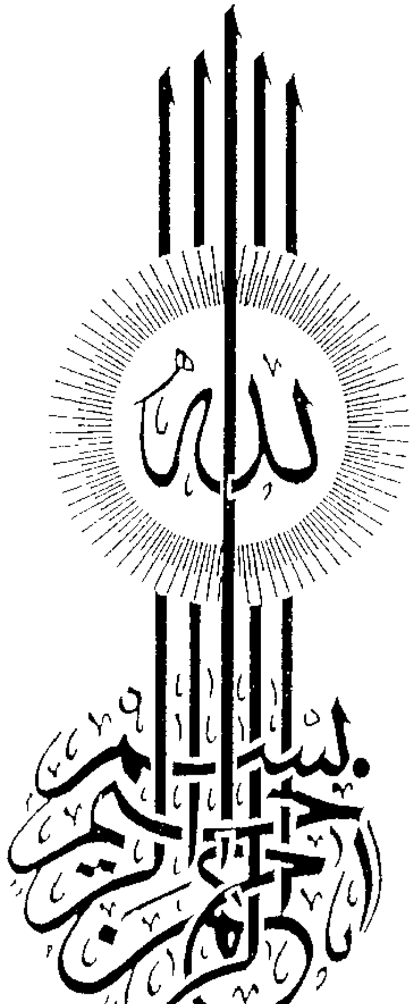
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ABBREVIATIONS

AOAC	Association of Official Agriculture chemicals.
BHC	Benzene hexachloride.
b.p.	Boiling point
C'	Degree centigrate.
Conc.	Concentration
DDT	Dichlorodiphenyl-trichloroethane.
dl	100 ml
g	gram.
GSH	Reduced glutathione.
Kg	Kilogram.
l	Litre
LD_{50}	Lethal dose $_{50}$.
min.	Minute
mg	milligram.
N.S.	Not significant
2-PAM	Pyridine-2-aldoxime-N-methiodide.
S.E.	Standard error.
Sec.	Second.
SGOT	Serum glutamate oxaloacetate transaminase.
SGPT	Serum glutamate pyruvate transaminase.
St.	Standard.
TCA	Trichloroacetic acid.
TD_{50}	Teratogenic dose$_{50}$.
u mol	micromole.
vit.	Vitamin
vol.	Volume
WHO	World Health Organisation.
wt.	Weight
%	Percent.

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AIM OF THE WORK

The need for massive quantities of food requires massive production, which is impossible without the use of pesticides such as insecticides. Insecticides are at the moment man's chief weapon against insects pests. Since these insecticides have toxic effects on plants, animals, and human beings, it is very important to study the effect of insecticides on the mammalian metabolism.

Diazinon is one of the most widely used organphosphous insecticides in the Egyptian fields and was chosen for this study.

The aim of this study was to investigate the biochemical changes that may appear in the blood constituents of rats previously fed on diets supplemented with this insecticide. The rats were fed on synthetic diets containing three different doses of diazinon,i.e., lethal , sublethal and postlethal doses, in comparision to control rats, fed on the normal free synthetic diet. This study included the following estimations:-

1- INTRODUCTION

INTRODUCTION

The destruction of insect pests on crops was long attempted, but with rather dispiriting results, using lead arsenate, tobacco dust, soap, and light petroleum. But in 1939, the dramatic possibilities of a potent and selective chemical for insect control were made evident by Paul Müller's discovery (in the Swiss firm,Geigy) of the insecticidal action of dichloro-diphenyl-trichloroethane (DDT). With this event, the modern era of insecticides was born (Albert, 1979).

DDT was used mainly by the Allied armies in the Second World War to control malaria and typhus during campaings.

By increasing crop yields, it played an important part in alleviating the needs for food and clothing of an ever-expanding world population. In 1962, however, there was a sudden realization that, because of its poor biodegradability, DDT constituted an ecological risk, namely a potentially harmful effect of the residues on wildlife (mainly fish, large birds and bees) and possible toxicological effect on man through chronic over-dosage. As a result, many countries banned the use of DDT in agriculture, or limited it to particular crops where no adequate substitute existed. The World Health Organization (WHO) successfully fought complete suspension of DDT use, while replacing it, wherever practicable.The principal replacements are; the biodegradable analogue methoxychlor, the more persistent of the carbamates as propoxur and of the phosphates (as diazinon), and abate (the tetramethyl ester of thio-4-,1-phenylene phosphorothioic acid). Other candidate phosphates are undergoing trial [particularly femitrothion (dimethyl 3-methyl-4-nitrophenyl phosphorothionate) and chloro-phoxim (diethyl 2-chloro α-cyano-benzylideneamino phosphoro-thionate)]. In places where resistance to chlorinated insecticides had set in, the change to carbamates or phosphates was imperative (Albert, 1979).

The suitability of a chemical to be used for insect control is not merely its degree of toxicity for there is a host,but also other factors must be considered. Chief among these are the action on the plant and the cost of the product, while a secondary but vitally important consideration is the ease of application (West and Hardy 1961[a]).

Classification of Pesticides:

Pesticides can be classified as followes as reported by Hayes, (1982[a]):

1 . Inorganic and Organometal Pesticides: There are at least 18 elements that characterize one or more inorganic pesticides. Of these elements, ten (chromium copper, zinc, phosphorus, sulfer, tin, arsenic, selenium, fluorine, and chloride) have been shown to be essential for normal growth. In these instances, the toxic effects clearly do not depend on the element per se but on the specific properties of one form of the element or one of its compounds, or merely on an inordinately high dosage.

The other eight elements (barium, cadmium,mercury thallium, lead, bismuth, antimony, and boron) have not been shown to be essential to growth of animals, although there is evidence that some may be. In any event, experience has shown that toxicity is not an argument against essentiality. Some highly toxic elements such as iron, selenium, arsenic, and fluorine certainly are essential to normal development.

The organometals and organometaloids have been described in connection with the corresponding inorganic compounds because, even though organic combination usually changes the absorption and distribution of a toxic metal and thus changes the emphasis of its effects, the basic mode of action remains the same.

2. Pesticides Derived From Plants and Other Organisms:

Different groups of pesticides derived from living organisms are entirely unrelated chemically and pharmacologically. They range from relatively simple alkaloids such as nicotine, with a molecular weight of only 162.23, through proteinaceous poisons to virulent living organisms.

3. Synergists:The possibility that synergists might assist in the control of pests is an attractive one that has been widely considered and selectively explored. Certain compounds increase the toxicity of pyrethrins to insects by as much as 100 times.

Synergists are also used with some of the synthetic pyrethrin analogues although the performance of these compounds is usually improved to a lesser degree. Synergists for certain methyl-carbamates, organophosphates and chlorinated hydrocarbons are also known. In fact, representatives of almost all types of organic insecticides can be synergized, at least as tested in houseflies. However, relatively few combinations of insecticides and