DETECTION OF SOME ENZYMES IN THE ACTIVE AND DIAPAUSE PHASES OF THE PINK BOLLWORM PECTINOPHORA GOSSYPIELLA SAUNDERS

A THESIS

Submitted in Partial Fulfilment of the
Requirement for the Award of the Degree of
MASTER OF SCIENCE

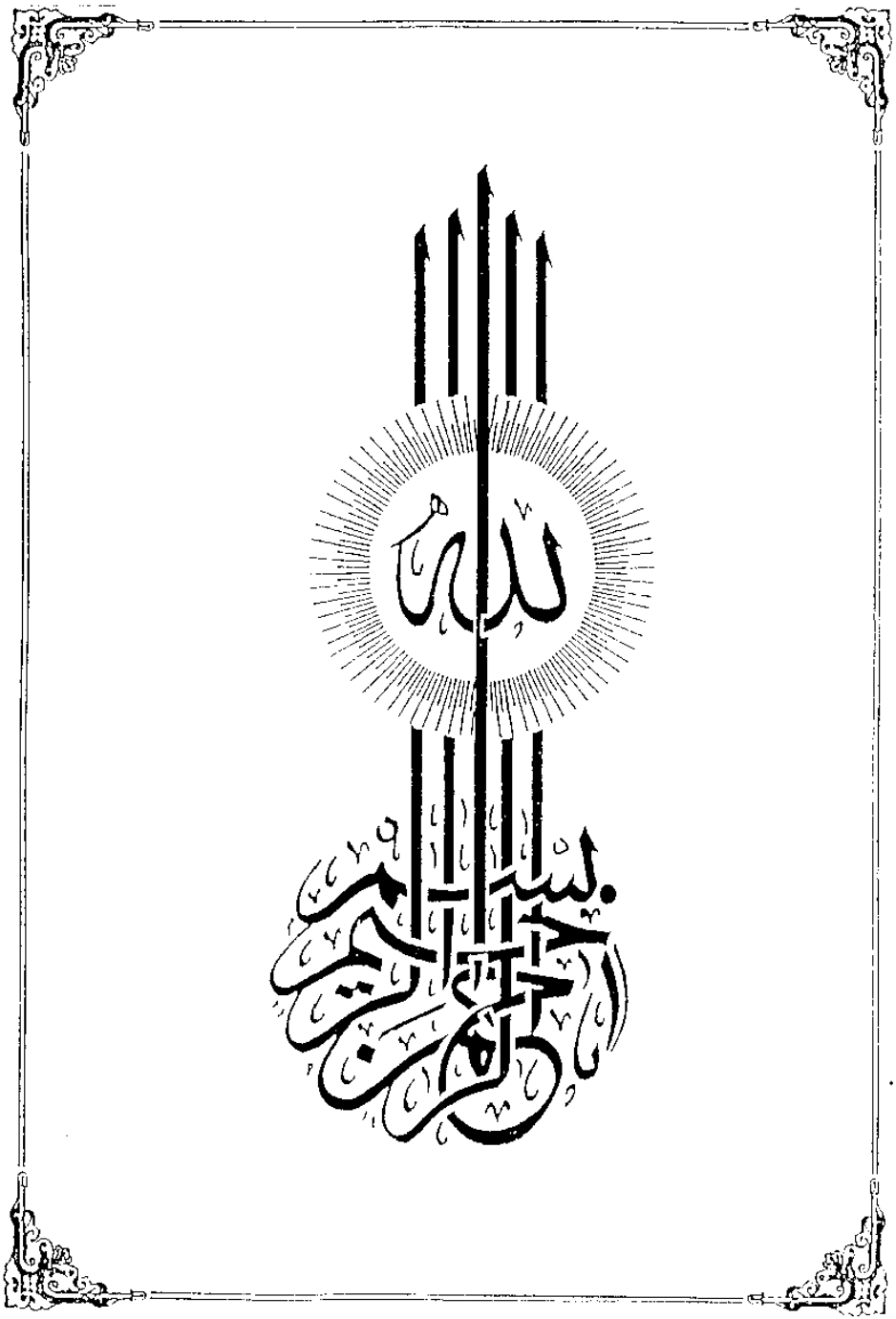
By

RAGAA KOUTB ABD EL GABER HAMED

B. Sc.

Department of Entomology
Faculty of Science
Ain Shams University
Cairo

1985



THESIS EXAMINATION COMMITTEE

NAME	TITLE	SIGNATURE
.....	.....	.....
.....	.....	.....
.....	.....	.....

BIOGRAPHY

Date and place of birth	: 27 February 1955, EL Menia.
Date of graduation	: June 1979.
Degree awarded	: B.Sc. Entomology-Chemistry.
Grade	: Very good.
Occupation	: Demonstrator in the Department of Entomology, Faculty of Science, Ain Shams University.
Date of appointment	: November 1979.
Date of registration of the M.Sc. degree.	: July , 1981.

Courses Studied by the Candidate in the Partial fulfilment of the requirements for the M.Sc. degree

---

Language:

French, M.Sc. Courses.

Examination passed on: March, 1981.

Entomology Courses.

1. New approaches to insect control.
2. Population dynamics and insect problem.
3. Microbiology.
4. Radiobiology.
5. Hormones and pheromones.
6. Chemistry of insecticides.
7. Pollution.
8. Taxonomy.
9. Research Subject.

Examination passed on: February, 1981.

Statistical Course:

Biostatistics.

Examination passed on: February, 1981.

Supervisors:

Prof. Dr. Zaky Mohammad Fathy Rostom, Professor of Entomology, Faculty of Science, Ain Shams University.

Prof. Dr. Bahira Mahmoud EL Sawaf, Professor of Entomology Faculty of Science, Ain Shams University.

Dr. Akila Mohammad EL Shafei, Lecturer of Entomology, Faculty of Science, Ain Shams University.

List of Abbreviations used in the present investigation

A	= active non-diapause larvae.
AChBr	= acetylcholine bromide.
AChE	= acetylcholinesterase.
AThChI	= acetylthiocholine iodide.
BuThChI	= butyrylthiocholine iodide.
CNS	= central nervous system.
Cu.S	= Cupper sulphide.
Cu.ThCh	= Cupper thiocholine.
D	= diapause larvae.
D_1	= early age of diapause larvae (40-days old).
D_2	= late age of diapause larvae (80-days old).
Gm	= gram.
ISO-OMPA	= tetra-iso-propylpyrophosphoramide.
M	= mole.
u M	= micromole.
N.S	= non-significant difference.
pS	= negative log of concentration of substrate.
T	= larvae during diapause termination.
vs	= versus.

CONTENTS

ACKNOWLEDGEMENTS

The author is indebted with sincerest gratitude to Prof. Dr. Z.M.F. Rostom . Professor of Entomology, Faculty of Science, Ain Shams University, for suggesting the problem, Supervising the work, kind encouragement and help in preparing the manuscript.

The author also wishes to express her appreciation and sincerest gratitude to Prof. Dr. B.M. El Sawaf, professor of Entomology, Faculty of Science Ain Shams University, for her direct guidance throughout the work and reading the manuscript.

The author's deepest thanks are due to Dr. A.M. EL Shafei, Lecturer at Department of Entomology, Faculty of Science, Ain Shams University for her direct supervision valuable guidance, and continuous encouragement that made this work possible.

The author is indebted with thanks to her colleagues at the Entomology Department for providing facilities that helped the author during the course of study.

1 – INTRODUCTION

1. INTRODUCTION

The pink bollworm Pectinophora gossypiella Saunders is an important pest of cotton plant in Egypt and many other countries. It is capable of causing tremendous financial losses of the cotton yield. The larva is an inside feeder within flowers, squares and bolls of cotton. The larva eats the seeds, tunnels and spoils the lint and causes the arrest of growth, rotting, premature or imperfect opening of the bolls.

The control of this pest is a complicated job due to the ability of the larvae to survive the adverse environmental conditions of winter. It overwinters in the fourth larval instar in a state of diapause. Such diapause phase hides in concealed places, usually inside "double seeds" of cotton. Any knowledge gained concerning changes in the biochemistry of the body during induction and termination of diapause is of great value in the control of this pest. The cholinergic system, concerned with the enzymes controlling the metabolism of the nerve transmitter substances , provides a fundamental insight into the initiation and elaboration of neural function during the sequential stages of insect

development. The cholinergic system comprises three components, the synaptic transmitter,acetylcholine (ACh), the acetylcholine hydrolyzing enzyme, acetylcholinesterase (AChE) and the acetylcholine synthesizing enzyme, choline acetylase (ChA). All these three components are present in high titre in insects as compared to most other invertebrates and very much higher as compared to vertebrates. Much evidence indicates that the neuroendocrine system regulates the induction and termination of diapause. The cholinergic system functions in synaptic transmission essentially as it does in vertebrates, but full classical proof is lacking (Wigglesworth, 1972).

This study was therefore thought to be helpful to determine and compare the levels of activity of the cholinesterase enzyme in the different phases of the 4 th instar larva of Pectinophora gossypiella by histochemical and biochemical methods.

Aim of the present work.

The present investigation aimed to determine and compare the level of activity of ChE in the larva of the pink bollworm during active (A), diapause (D) and termination of diapause (T) phases. This was achieved by: