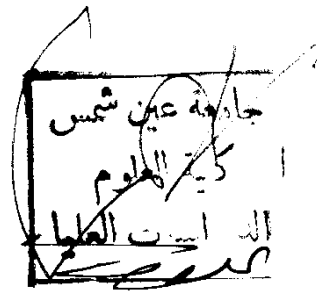
BIOLOGICAL STUDIES ON SANDFLIES IN RELATION TO LEISHMANIA TANSMISSION IN EGYPT



A THESIS

Submitted in Partial Fulfilment of the

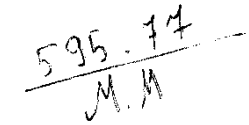
Requirements for the Degree of

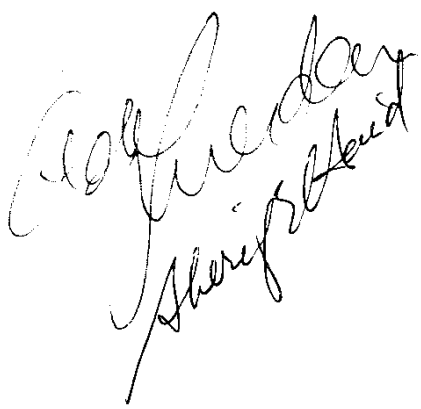
MASTER OF SCIENCE

By

MANAL MOHAMED ALY RIFAAT

B. Sc.



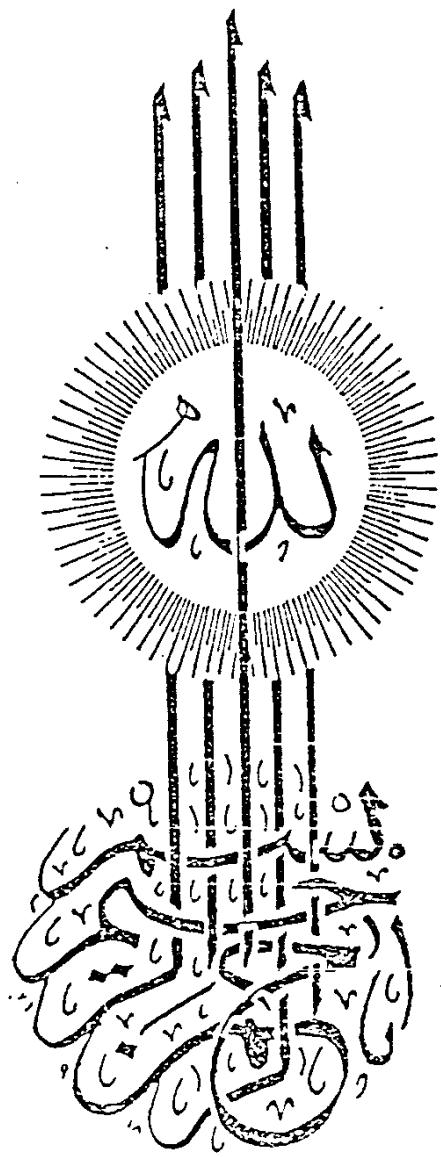


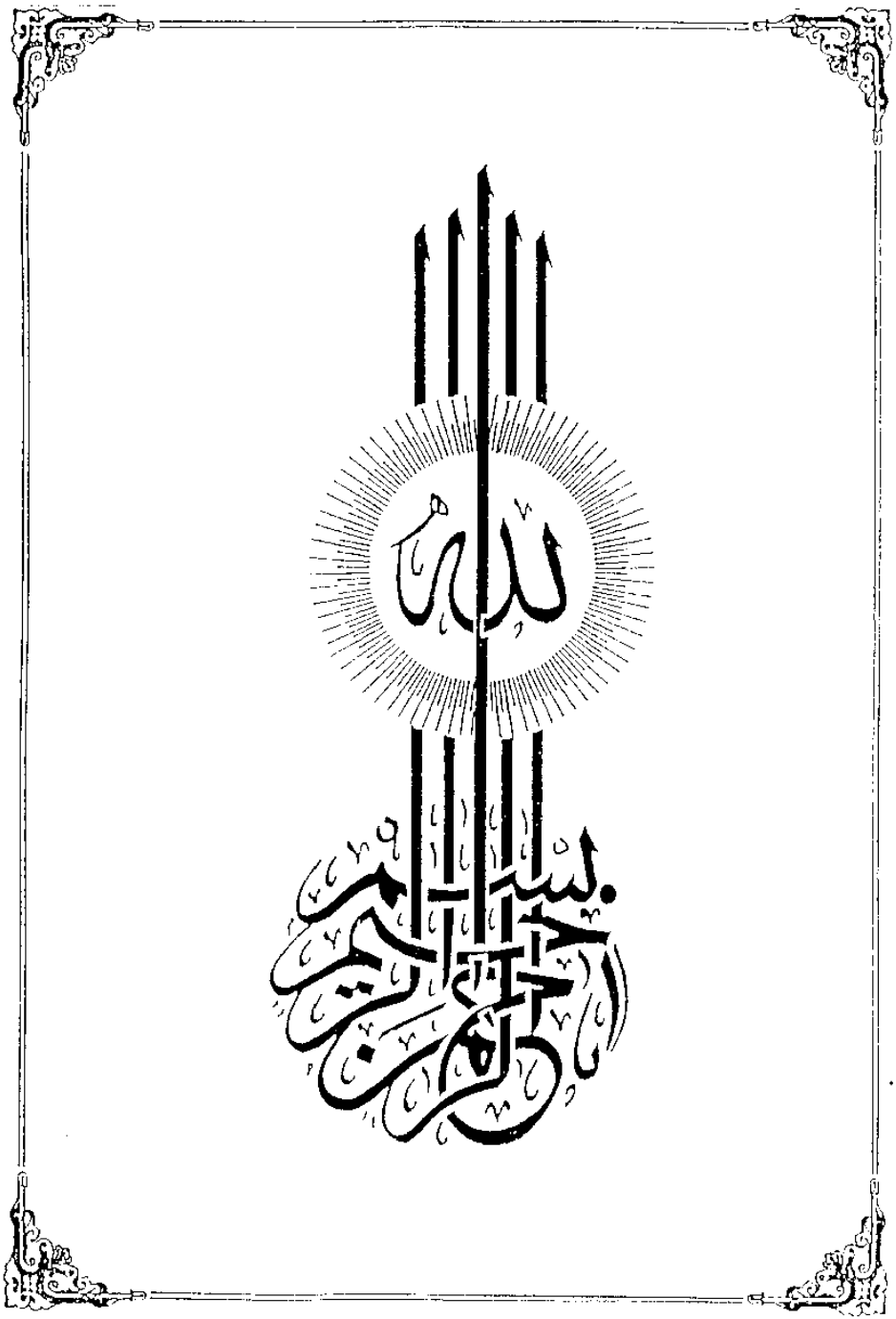
Department of Entomology

Faculty of Science

Ain Shams University

1986





THESIS EXAMINATION COMMITTEE

Name	Title	Signature
.....	.....	.....
.....	.....	.....
.....	.....	.....

BIOGRAPHY

Date and Place of Birth	:	11 January 1958. Cairo
Date of graduation	:	May 80
Degree awarded	:	B.SC. Entomology
Grade	:	Very Good
Occupation	:	Demonstrator, Parasitology Department Faculty of Medicine, Ain Shams University.
Date of appointment	:	June 1981
Date of registration	:	March 1983

SUPERVISORS:

Prof. Dr. Adel I. Merdan

Dr. Sherif M.El.Said

(Entomology Department, Faculty of Science, Ain Shams University)

Prof. Dr. Hashem A.Abdel Rahman

Head of Entomology Department

COURSES STUDIED BY THE CANDIDATE IN PARTIAL FULFILLMENT FOR THE DEGREE OF MASTER OF SCIENCE

Language : French: M.Sc. course

Examination passed on March 1982.

Entomology courses:

1- Environmental pollution

2- New approaches to insect control

3- Microbial control of insects

4- Insect taxonomy

5- Chemistry of pesticides

6- Radiobiology and applied entomology

7- Insect hormones and pheromones

8- Research subject

Examination passed on February 1982

Statistical course: Bio-statistics

Examination passed on February 1982

ACKNOWLEDGMENT

The present work has been despatched in Research and Training Center on Vectors of Diseases, Ain Shams University.

The candidate wishes to express her sincere gratitude to who shared in suggestion of the problem, supervision of the work guidance and assistance during the period of this study; namely Dr. Adel, I. Merdan, Professor of Entomology and director of the Center, and Dr. Sherif, M. El-Said, Assistant Professor of Entomology and the principal investigator of the project.

The candidate is sincerely indebted to Dr. John C. Beier, National Institutes of Health (NIAID) resident consultant to Ain Shams Center (from 8/82 to 4/85) for his great help and for his input and scientific cooperation, especially in experimental studies.

Special thanks are due to Dr. Bahira El Sawaf, Professor of Entomology for her role during carrying out this work.

The candidate wishes to extend her deep thanks to Dr. Tosson,A.M., Professor of Entomology,Faculty of Medicine, and Dr. N.S. Mansour (NAMRU - 3, Cairo, Egypt) for providing *Leishmania* strains.

The candidate's gratitude should also be expressed to all staff members and colleagues of Ain Shams Research and Training Center on Vectors of Diseases for their help and cooperation throughout the period of this study.

The present investigation isapart of the scientific plan of the project entitled , "Epidemiology and Control of Anthropod-Borne Diseases in Egypt" , supported by grant No. NO1 AI 22667 , NIH - NIAID .

CONTENTS

INTRODUCTION

INTRODUCTION

The study of sandflies in Egypt in relation to Leishmaniasis transmission became an interesting subject since the outbreak of the so-called Midetteranean infentile Kala azar at El-Agamy area west to Alexandria at the North coast (Rifaat et al., 1983 ; Twefik et al., 1983). Several studies were carried out to survey sandfly in Egypt and their distribution. However all available literatures indicated the presence of Phlebotomus papatasi as the only sandfly species in Egypt, (Zein El dine 1972).

According to several authors (Ashford et al. 1977, Schlein et al. 1982, Killick - Kendrick et al., 1985), it is well known that Ph. papatasi is responsible for the transmission of cutaneous leishmaniasis only. The present investigation aimed at an explanation of the possible role that may played by Ph. papatasi collected from El-Agamy area in the transmission of this type of Kala-azar outbreak. The present study aimed also at studying the biological characters of this sandfly species through colonization as it was known that sandflies are very difficult to be colonized at the laboratory. The laboratory colonized flies were also Tested for their succeptibility to Leishmania parasites, both for cutaneous and visceral types to compare its vectorial capacity under controlled conditions.

Aim of the Present work:-

1- To colonize Ph. papatasi field collected strains under laboratory conditions.

2- To study the biological and morphological characters of Ph. papatasi.

3- To experimentally infect the colonized strain with different Leishmania species, isolated from human and animals and testing its capacity in their transmission by the detection of Promastigotes in the mouth parts.

REVIEW OF LITERATURE

II. LITERATURE REVIEW

Hafez et al. (1964), described the techniques of laboratory colonization of Phlebotomus papatasi Scopoli. An original method of breeding Phlebotomus papatasi Scopoli in the laboratory in the Egyptian climate was evolved, where by the development of a fungal growth a well-known obstacle, was prevented by incorporating, in the larval feeding medium, living material from cultures of a bacterium, Alcaligenes viscosus, which had been found to be the predominant microorganism in samples of soil collected from breeding places of Phlebotomus papatasi in the field. Later, eight other schizomycetes were also found to keep in check the development of mould. Certain fungicides also gave satisfactory results. Breeding pots made of unglazed earthenware were used. A layer of finely sieved sand (18 meshes) about 5 cm deep, was placed at the bottom of the pot and moistened with sterile water. To a mixture of one part dried, ground, sieved guinea pig feaces (60 meshes). and two parts sieved dry earth (60 meshes), sufficient of a water suspension of the bacterium was added to impart a damp but friable condition. Granules of this larval feeding medium were then scattered over the sand in a loose layer about 1 cm thick. Each breeding pot was stood in a petri-dish of water and was placed in a small muslin cage to which obtained their blood meals from three day old white mice, oviposited within the pots and no eggs were laid elsewhere . Development from

egg. to adult was completed successfully in this medium and a healthy culture of the insect was maintained in the laboratory for several years.

Davis, (1967) studied the morphology of two species of sandflies in Sudan republic. Phlebotmus papatasi and Ph. orientalis were studied to provide an up to date morphology of sandflies and to compare the morphology, of the representative of cutaneous and visceral Leishmaniasis vector groups . Descriptions of the external anatomy of the head, mouth-parts, thorax, abdomen and genitalia are given. It is concluded that the principal genital claspers of the male are parameres, and appropriate designations of other genital structures are made. The musculature of head and mouth parts are described and mechanics of feeding discusced. The alimentary canal of Ph. papatasi and Ph. orientalis was significantly different . In the latter, the anterior midgut is more voluminous and the cardia less clearly differentiated . These differences may be related to the respective vector roles of these 2 species. In addition to the alimentary canal, description are given of the reproductive and nervous systems.

Rifaat and Hassan (1967), stated that inspite of reports by Philips and panayotatou on sporodic cases of visceral leishmaniasis in Alexandria, Egypt was actually considered to be free of Visceral Leishmaniasis disease . This is because