STUDIES ON THE RELATIONSHIPS OF THE SNAIL GENUS BIOMPHALARIA IN EGYPT WITH CERTAIN STRAINS OF SCHISTOSOMA MANSONI

A THESIS

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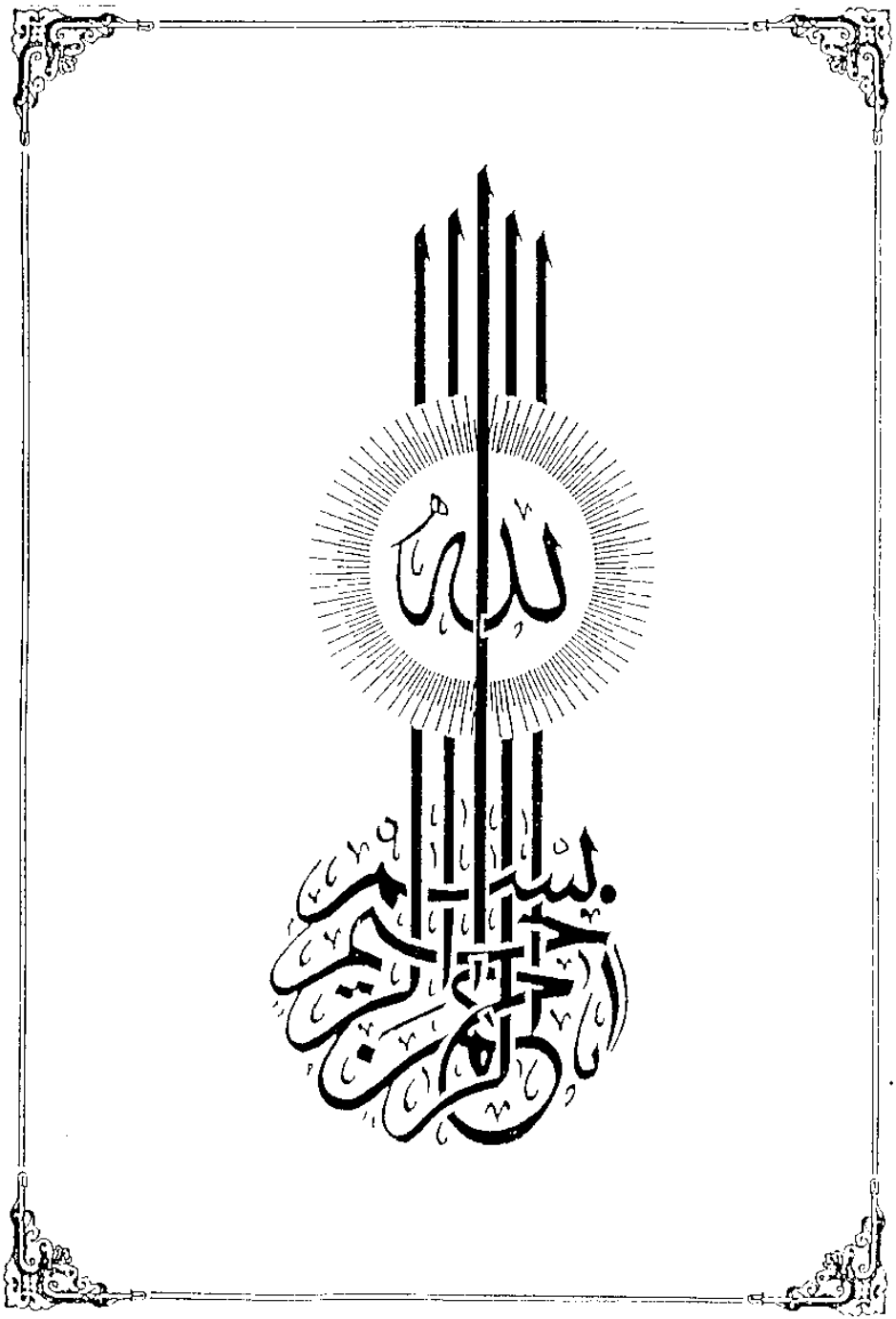

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EXPLANATION OF FIGURES

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ABBREVIATIONS

A.	Amoebocytes
B.	Body
Br. Cm.	Brood chamber
Ca	Calcification
Ci	Cilia
Ch	Chromatin
Cy. P.	Cytoplasmic processes
D. Sp.	Daughter sporocyst
Dg. Pc.	Degenerating parenchyma
Dg. Sp.	Degenerating sporocyst
Ec. V.	Endocytotic vesicle
Es. Dt.	Escape duct
F.c.	Flame cells
G. C.	Germinal cell
Gr.	Granulocytes
Gx.	Galycocalyx
Hy.	Hyalinocytes
L.	Lipid
La. Gl.	Lateral gland
Ls.	Lysosomes
M.	Miracidium
Mi.	Mitochondria
Mo. Sp.	Mother sporocyst

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Mu. Ly.	Muscle layer
Mv.	Microvilli
N.	Nucleus
No.	Nucleolus
Pi. Ep.	Primitive epithelium
Po. Dt.	Postacetabular duct
Po. Gl.	Postacetabular gland
Pr. Dt.	Preacetabular duct
Pr. Gl.	Preacetabular gland
Ps.	Pseudopodial processes
S. H.	Snail haemolymph
S. T.	Snail tissue
Se. Pa.	Sensory papilla
Sn.	Spine
Ta.	Tail
Te.	Tegument
Te. Co.	Tegumental collar
Te. Fl.	Tegumental fold

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GENERAL INTRODUCTION

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For thousands of years, a chronic endemic disease characterized by haematuria and certain gynaecological troubles has been known to occur in Egypt. A simple clinical account of the disease is reported in some ancient Egyptian papyri dated about 3000 B.C. (Riad, 1962). Haematuria is also described in one of the papyri written about 1900 B.C. and found in the ruins of the old town of Kahun, near the entrance to Fayoum (Farooq, 1973). The eggs of the disease agent have been discovered in the kidneys of Egyptian mummies believed to have died about 3000 years ago (Ruffer, 1910).

Historians of medieval Egypt reported some of the clinical symptoms of the disease. The medical reports of the French Campaign in Egypt (1799-1801) point to haematuria as an important suffering among French troops (Farooq, 1973).

In the middle of the 19th Century, the causative agent of the disease was discovered by Theodor Bilharz in a mesentric vein, during a post-mortem examination at Kasr-Al Aini Medical School in Cairo (Bilharz, 1852). He identified the disease agent as a blood fluke which was called Distoma haematobia. Meckel von Hemsbach (1856) discovered the generic name Distoma and assigned the fluke to the genus Bilharzia which was established by him to accomodate these unique

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trematodes. Two years later, Weinland (1858), not knowing of Meckel von Hemsbach's thesis which had a limited circulation, established the genus Schistosoma for the same flukes. For several years, bitter dispute continued amongst parasitologists to establish the validity of either Schistosoma or Bilharzia as generic names of the parasite.

The dispute was finally settled by the International Commission of Zoological Nomenclature in 1948 who used their plenary powers to decide the validity of the name Schistosoma and the suppression of the generic name Bilharzia. The history of the events which led to that decision is summarized by Mansour (1962).

During the 19th Century, much controversy also arose about the life cycle of schistosomes and the role of snails in the transmission of these parasites. This controversy was settled by the startling discovery of snails as intermediate hosts of oriental schistosomiasis (Miyairi and Suzuki, 1914). Leiper and Atkinson (1915) confirmed that discovery in Japan. Later, Schistosoma haematobium and Schistosoma mansoni were definitely established as the causative agents of urinary and intestinal schistosomiasis in Egypt and their respective

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snail intermediate hosts were discovered (Leiper, 1915 and 1918). Leiper's work in Egypt formed the basis for further work on urinary and intestinal schistosomiasis in Africa.

During the first half of the 20th Century, much was learned about the epidemiological, biological and pathological characteristics of schistosomiasis. Despite tremendous achievements in developing control methods against the disease, it is still considered as one of the most important endemic diseases in many tropical and subtropical countries. Unlike some other infectious diseases which have been recently brought under control, schistosomiasis is an alarming problem, especially in developing areas where newly constructed irrigation schemes increase significantly the possibility of infection. Some 200 millions people are probably infected in the world and another 500-600 millions are exposed to the risk of infection (Webbe, 1981).

Schistosomiasis is still considered as one of the most important endemic diseases in Egypt and its impact on health and economy is tremendous (Farooq and Samaan, 1967). Most of the development and health plans in the country put this problem as a high priority.

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In Egypt both urinary and intestinal schistosomiasis are still present. Originally, urinary schistosomiasis caused by S. haematobium was widely spread, occurring throughout the Nile Valley while intestinal schistosomiasis caused by S. mansoni was confined to the Nile Delta. During the last few decades, there has been a steady and significant change in the epidemiology and pattern of distribution of both species of schistosomes and their respective intermediate hosts, with S. mansoni and its snail host B. alexandrina spreading into new areas which have been hitherto free of the parasite and its snail intermediate host. In view of this change and due to the higher morbidity of schistosomiasis mansoni, wide interest and attention are now directed to the study of S. mansoni and its relationships with the snail intermediate host Biomphalaria alexandrina.

An interesting development in medical biology has been the clear demonstration of infra-specific variations in the biological properties of schistosomes and their intermediate snail hosts (Nelson and Saoud, 1968). These variations are of fundamental importance in the epidemiology of schistosomiasis. Variations in infectivity for either the intermediate or the definitive hosts determine the basic ecology and variations in

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