STUDY OF THE ULTRASTRUCTURE OF THE GASTROINTESTINAL TRACT IN SCHISTOSOMIASIS.

THESIS

Presented for Ph.D.

(Medical Science Anatomy)

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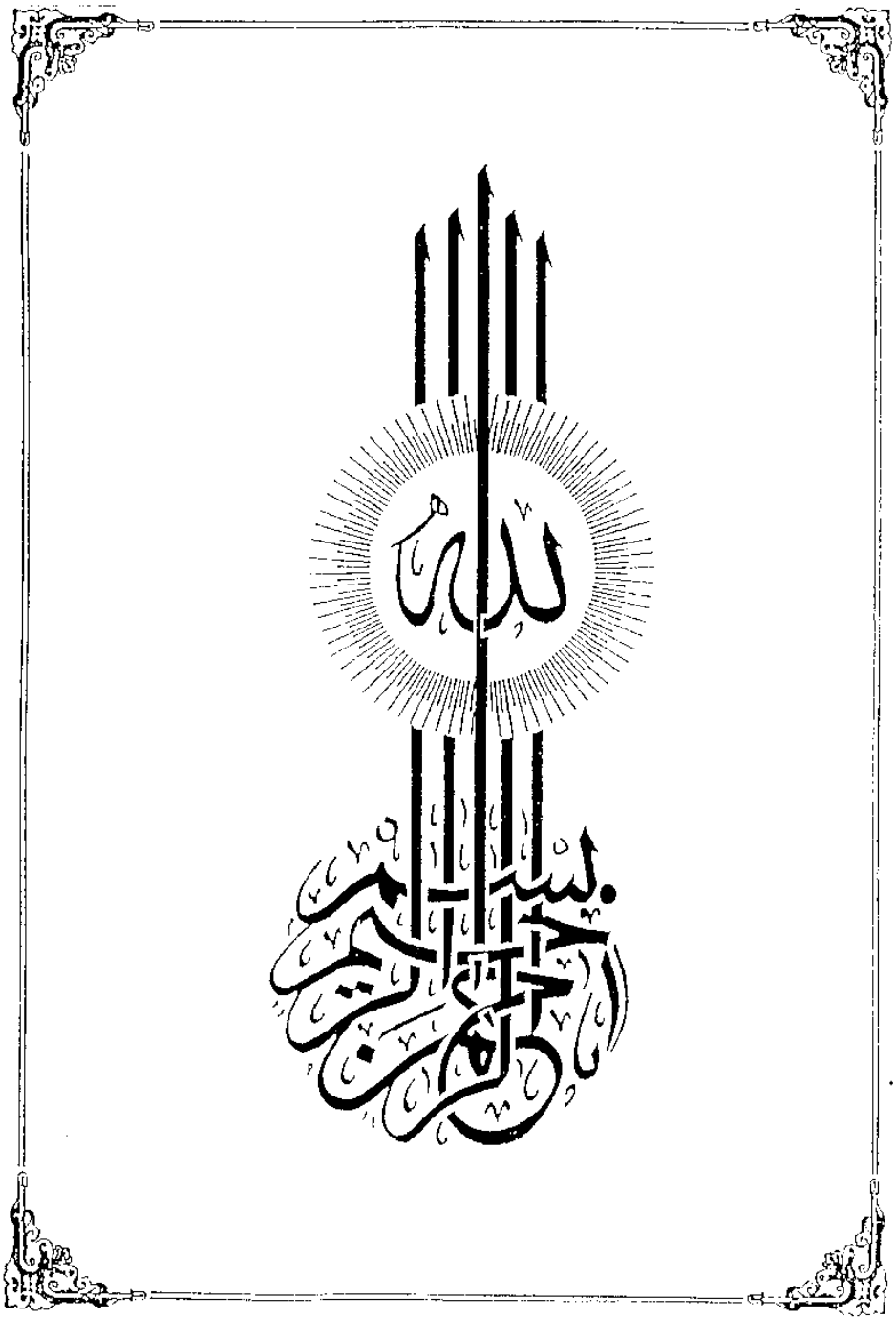

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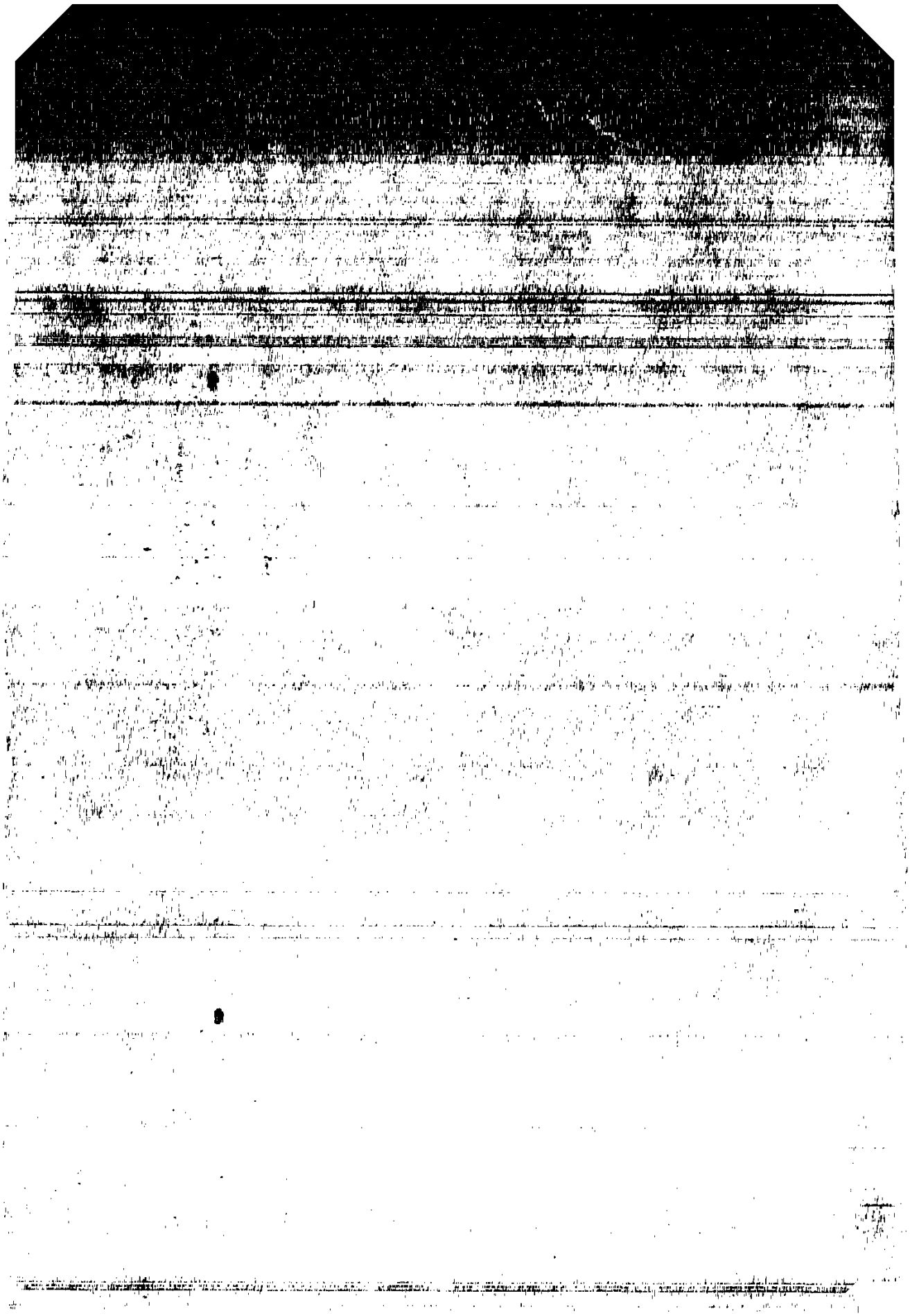
INTRODUTION



INTRODUCTION

The small intestine, the colon and the liver comprise the three organs that are most heavily involved in Schistosoma mansoni infection, in both man and experimental animals. Nevertheless, investigations of the pathology and pathophysiology of the intestine and colon are notably fewer than those of the liver. Electron microscopic studies of the gastrointestinal tract are almost rare. The pathology of bilharzial intestine has been well described in human postmortem studies and briefly discussed in investigations performed on monkeys and several animals.

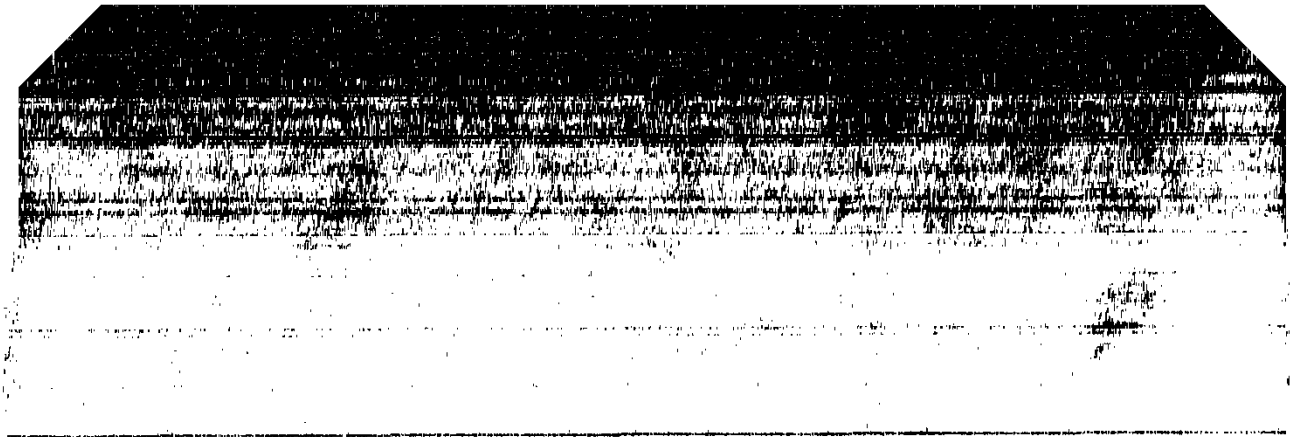
The aim of this work was to study the organ dependent differences in the cell composition of the granuloma and to study the ultrastructural changes in intestinal bilharziasis. A trial was also made to correlate the histopathological changes with the clinical picture. All the above are no more than tools that may lead to a better understanding of this complex multifactorial granulomatous disease.

The effect of treatment by praziquantil in the chronic murine schistosomiasis mansoni was also described, on the liver and for the first time on ileum and colon.

Mice biopsies were taken to insure a pure single mansoni infestation and a precise duration of infection and treatment.

The experimental biopsies enabled us to examine the histopathological changes in all layer of the gut wall.

REVIEW OF LITERATURE



REVIEW

1. Historical and geographical spotlights on human bilharziasis

Actually the history of bilharziasis goes back to the ancient Egyptian civilization. The disease was mentioned several times in 4 different papyrus, 28 times in Ebers papyrus, 12 times in Berlin papyrus, 9 times in Hearst papyrus and one time in London medical papyrus. Although these papyrus were written about 1500 B.C., Ebbel, the great egyptologist translated in 1927 the Egyptian word "aaa" applied on this disease. The Egyptians called the parasite which cause it "Hrrw". They knew also the antirony as treatrent for this disease.

In 1851, it was the great discovery of the worm by Theodore Bilharz, in Kasr El Aini School of Medicine he gave it the name Distomum haematobium. On communicating his discovery to his learned colleagues in Gerrany, the name Distomum was immediately discarded and the material was described in 1856 as bilharzia haematobium, by Meckel Von Hemsbach. In 1856 Weinland gave the name Schistosoma haematobium. In 1859, reference was made by Cobbold in one of his publications to this worm as bilharzia in honour of its discoverer Bilharz. Uptill now the problem of nomenclature has not been solved between Bilharzia and Schistosoma, and both terms are currently used with slight predominance of the term Bilharzia at least in Egypt and France but still Schistosoma is used for differentiation of species.

Bilharz described the female worms as having terminal and lateral-spined eggs, since the latter eggs were encountered in the stools and rarely in the urine of the same patient. This incredible observation remained unchallenged for a very long time, although many scientists did not approve with Bilharz's

findings and it was only corrected when a worm with terminal single spined eggs was discovered in South Africa and others with single lateral spines in South Africa and the west Indies. Therefore, it was concluded that there must be two worms, terminal-spined haematobium and lateral-spined named mansoni in honour of Sir Patrik Manson, the father of tropical medicine .

Ruffer, in 1910, during histological studies of certain Egyptian mummies of the XXth dynasty (1000 B.C.). Discoverd Schistosome eggs in the kidneys of these mummies situated for the most part among the straight tubules, and thus proving antiquity of the disease in our homeland .

Forty four years after Bilharz's discovery (i.e. 1895), the Japanese discovered S. Japonicum . Although they were late in discovering the worms, witnin a short time afterwards (between 1909-1914), they described for the first time the life cycle in the snail intermediate host, and the infective cercarial stage and the mode of infection .

Leiper (1916) after studying the work of the Japanese, returned to Egypt to prove the following :

1- there were two distinct species of worms one producing terminal spined eggs only, and another with typically lateral-spined ova . The former being resident of the vesical and urogenital plexuses, while the later were specific intestinal parasites ;

2- the adults were morphologically distinguishable ;

3- the required different molluscan hosts ;

4- the infection was acquired by cercariae through penetration of intact skin .

In Egypt we have two species of Schistosoma:

A- **Schistosoma mansoni** is of limited distribution in Egypt; being confined to the Delta region (Lower Egypt), particularly near the end (3rd order) canals of irrigation. It is rarely found south of Cairo, due to the absence of the specific intermediate host (Biomphalaria Alexandria).

B- **Schistosoma haematobium** is distributed all over Egypt, especially after the building of the High Dam and facilities of irrigation all the year round in Upper Egypt, the incidence of the disease has raised from 3-5% to 50-70% in some areas (Salem, 1962; Helmy, 1962).

Clinical, epidemiological and parasitological studies, have precised four different species of Genus Schistosoma, that affect the man all over the world: Schistosoma mansoni, Schistosoma haematobium, Schistosoma Japonicum and Schistosoma intercalatum and very rarely Schistosoma Matthei and Schistosoma Bovis.

About 300 million patients suffer from Bilharzia all over the globe. The infection is prevailing as new irrigation schemes provide an ideal breeding habitat for the snails (Mahmoud, 1977).

This disease is the second most spreading disease in the world after Malaria. It affects principally the persons in the tropical and subtropical areas (Manson-Bahr and Apted 1982).

The World distribution of different schistosomes Salem, 1962; was summarized as follows:

A- Schistosoma mansoni is present especially in the upper Sudan and several patches of west east, central and south Africa (but not Angola though the snails are present there, the reason is not known), in the west coast of Arabia and Yemen. In the western hemisphere, the parasite has been reported from Brazil, Venezuela, Dutch Guiana, and the west Indies.

B- Schistosoma haematobium is found all over Africa, extending towards Tripoli, Algeria, with a hyperendemic focus in Southern Tunisia. In the Sudan, it is widespread in Gezira Province. It is also present in east and central Africa as well as in the west coast of Africa from Senegal to Angola and on the islands of Madagascar and Mauritius. In Europe, foci of infection have been found in Portugal, Spain, Greece and Cyprus. In western Asia, the parasite has been recorded from Palestine, Syria, Saudi Arabia, Iraq, and with small focus in India.

C- Schistosoma japonicum as an oriental variety endemic in the far eastern countries of China, Philippines and Japan.

D- Schistosoma intercalatum is met with in central and west Africa. The rectal manifestations are predominant with rarely genital affection.

2. Clinical Picture and Incidence of Schistosomiasis mansoni

Penetration of cercariae may produce a temporary dermatitis. The allergic reaction which occurs 3-6 weeks later is often severe with onset of fever, sometimes with rigors and heavy sweating, nausea, vomiting, abdominal discomfort with fullness over the liver, which may be tender and slightly enlarged, diarrhea, and a dry unproductive cough with dyspnea. An

urticarial or papular rash may develop . The patient feels ill and prostrated . This stage may continue for some weeks (Manson-Bahr and Apted, 1982) .

Eggs are secreted 6 weeks - 2 months from the time of infection and may be found in smears of the diarrhoeic stools . The clinical picture after this stage depends on egg disposition in the tissuse and the reaction around them (Scott, 1974 and Manson-Bahr and Apted, 1982) .

Egyption investigators observed regional ileitis-like syndrome in two case reports (tesluk, 1953; Mynors, 1957). Frequent abdominal distension and colic were observed in moderate to sever cases by; Fayez,Abdel-Khalik and Aziz (1962). The dysentery stage was characterized by diarrhoea with blood and mucus, abdominal pain and discomfort, loss of weight and anaemia . Eggs were easily found in the dysenteric stool . the small intestine could be affected either directly by oviposition or indirectly through reflection of portal hypertension (El-Rooby, 1976) .

The hepatosplenic stage follows with more abdominal discomfort and progressive enlargement of the liver and the spleen . Eosinophilia is moderate . Another common form which is seen in Egypt is one in which the pulmonary signs are prominent, and eggs may be found in the sputum . Exacerbations and remissions exist for sometime till the clinical results of the intestinal damage and complications such as portal hypertension manifest .