STUDIES ON THE PARAMPHISTOMES OF SOME RUMINANTS FROM A.R.E.

Presented By

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In addition to the work presented in this thesis, the candidate has attended post-graduate courses in the following topics, and successfully passed examinations in them:

1-Advanced Parasitology.

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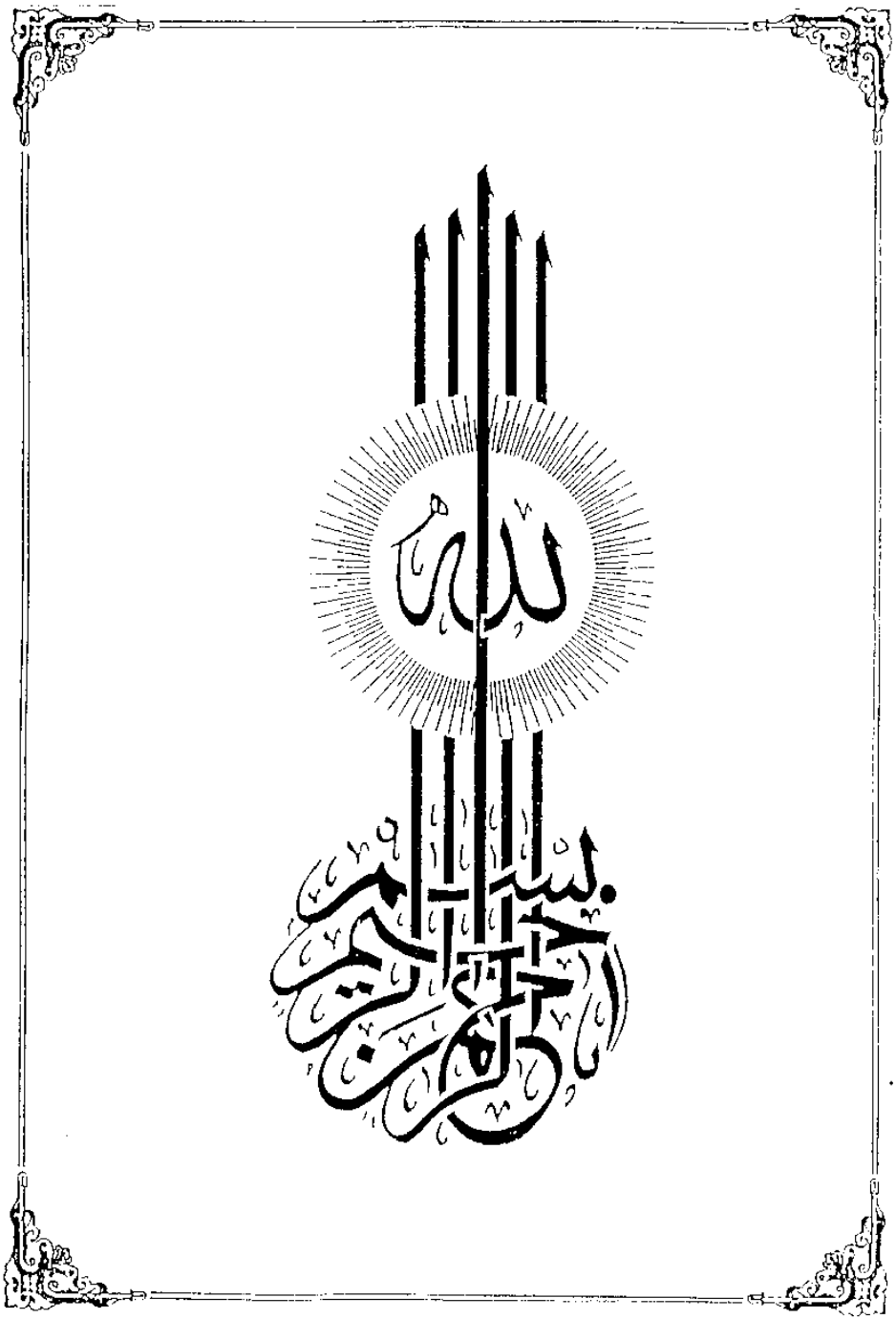

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In ruminants, it is common to find trematodes with conical or almost cylindrical bodies attached to the inner surface of the rumen or reticulum by means of strong posterior adhesive organs in the form of muscular suckers. The flukes are usually quite abundant and can be easily observed by workers in any abattoir. They appear in the rumen or reticulum as whitish or flesh coloured patches, formed by the aggregation of large numbers of these flukes which are usually called stomach flukes, conical flukes or paramphistomes.

I- ECONOMIC IMPORTANCE AND PATHOGENICITY OF PARAMPHISTOMES.

It was considered, for a long time, that the paramphistomes were completely non-injurious to their vertebrate hosts, but this view has been challenged recently. An acute disease of calves and sheep caused by the immature conical flukes in the small intestine has been reported from various parts of the world and this disease is now regarded as being of economic importance specially in countries with an advanced animal industry (Dinnik, 1964 and Horak, 1962 & 1967).

An epidemic of paramphistomiasis is characterized by acute parasitic enteritis and heavy mortality caused by the young flukes in the abomasum and small intestine of

sheep and cattle (Horak, 1967). Le Roux (1930), Simson (1962) and Butler & Yeoman (1962) gave detailed accounts of the symptoms and microscopic pathology of paramphistomiasis. They described congestion of the blood vessels on the peritoneal side of the affected intestine, hyperaemia, haemorrhages and thickening of the mucosa giving the internal surface a corrugated appearance, cachexia, hydropericardium, hydrothorax, ascites and oedema of the mesentery, abomasum and submandibular space. Le Roux (1930) described two outbreaks of this disease in the Orange Free State, South Africa, and he identified the specimens recovered from the infested sheep as Cotylophoron cotylophorum (Fischoeder, 1901). The mortality in flocks of 275 and 300 was approximately 30 and 50 % respectively. Dinnik (1958) re-examined the specimens collected by LeRoux, and he found that they are Paramphistomum microbothrium, Fischoeder, 1901 and not Cotylophoron cotylophorum Fischoeder, 1901 as it was thought earlier. Yeoman (1962) recorded acute paramphistomiasis also in Tanzania, and he found a mortality of 73 in a total of 76 young zebu cattle, in which the etiological agent was Paramphistomum microbothrium, Fischoeder, 1901.

Horak (1967) has shown that post-mortem examination of infected cattle revealed generalized emaciation of the carcass, hyperaemia and oedema of the first two metres of the small intestine and numerous immature paramphistomes in and on the mucosa of the affected intestine. Dinnik (1964) suggested that more than 100,000 metacercariae are required to cause a fatal disease in a calf or sheep.

Horak (1967), summarized the observations on the micropathology given by several authors. Infestation of rumen causes oedema of the epithelial layer and lymphatic infiltration in the propria and sometimes the submucosa. In the vicinity of flukes, the mucosa is necrosed and sloughs with some hypertrophy of the stratum corneum, the tips of the papillae also degenerate and slough. Some immature flukes were found deeply embedded in the submucosa and some may reach the muscularis mucosa. Lymphocytic infiltration may occur around the flukes. The young paramphistomes attach themselves to the intestine by means of a plug of mucosa drawn into the acetabulum. This mucosa becomes strangulated and necrotic, severing takes place. Some of the parasites may penetrate to the peritoneal cavity and cause haemorrhages on the

acrosa (Porcy 1959). Horak (1967), [illegible] the following symptoms : "A progressive decrease in appetite, terminating in complete anorexia, little reduction in the total water consumption, the hair coat is staring in cattle, diarrhoea and then finally death occurs. If death does not occur, marked loss of condition and body weight persists for a long period...." Horak (1967) also recorded 11.4 kg. loss within 52 days in sheep, and a 27.3 kg. decrease after 140 days in bovines, while an uninfected bovine gained 50.9 kg. during the same period.

PARAMPHISTOMIASIS AS ZOONOSES

Some species of paramphistomes which are parasites of wild ruminants, were occasionally encountered in domestic ruminants. These include Gigantocotyle symmeri Näsmark 1937, G. lerouxi Yeh, (1962), Cotylophoron indicum (Stiles and Goldberger, 1910), C. fülleborni Näsmark, 1937, Ceylonocotyle scoliocoelium (Fischoeder, 1910) Carmyerius graberi Gretillat 1960; C. papillatus Gretillat, 1962 and Stephanopharynx compactus, Fischoeder 1901. It is possible that these species of conical flukes which are parasites of wild ruminants, may occasionally infest domestic ruminants in places where the wi d and domestic stocks live closely together.

Some other stomach flukes have been found in wild antelopes and so far have not been reported from domestic ruminants e.g. Stephanopharynx secundus Stunkard, 1929, Carmyerius bubalis Innes 1912, C. endopapillatus Dollfus 1962 , C. minutus Fischoeder 1901, C. parvipapillatus Gretillat,1962, C. wulli ani Stiles and Goldberger, 1910 and C. wenyoni (Leiper, 1908).

PARAMPHISTOMIASIS IN AFRICA

Dinnik (1964) recorded thirty two species of conical flukes in Africa. These flukes belong to three subfamilies: Paramphistominae, Gastrothylacinae and Stephanopharynginae. Dinnik believed, however, that only ten species can be regarded as common parasites of domestic ruminants (cattle, water-buffalo, sheep and goats) in Africa, namely Paramphistomum microbothrium Fischoeder, 1901; P. phillerouxi Dinnik, 1961; P. daubneyi, Dinnik 1962; P. sukumum, Dinnik 1964; Calicophoron raja, Näsmark 1937; Cotylophoron cotylophorum, Fischoeder 1901; C. jacksoni, Näsmark 1937; Carmyerius mancupatus, Fischoeder 1901; C. spatiosus (Brandes, 1898) and C. gregarius (Looss, 1896). These ten species are not evenly distributed throughout the African Continent, because their distribution depends on that of their intermediate snail hosts and on various environmental and climatic

conditions. Dinnik (1964), for example, stated that in the Highlands of Kenya, Paramphistomum microbothrium, P. daubneyi and Cotylophoron jacksoni are the only predominant stomach flukes in cattle although in the Southern Highlands of Tanzania P. microbothrium and Cotylophoron jacksoni are predominant and no P. daubneyi are found, and in the warmer areas of Kenya and Tanzania near Lake Victoria the cattle harbour principally Paramphistomum sukumum P. phillerouxi, Calicophoron raja and Cotylophoron cotylophorum.

Also, sporadic infestations of cattle with other species viz. Paramphistomum sukari Dinnik, 1964, P. clavula Näsmark 1937, Bothriophoron bothriophoron (Braun 1892) Carmyerius dollfusi Golvan and Gretillat, 1957 and C. exoporus Maplestone, 1923 were recorded

PARAMPHISTOMIASIS IN EGYPT

A limited number of papers have been published on the paramphistomes in Egypt. Ezzat (1943) described specimens from Gazella dorcas which were identified as Paramphistomum cervi (Zeder, 1790). His identification was based on the descriptions and investigations carried on by Stiles

and Goldberger (1910), Hapiestone (1923), Fukui (1929) and Dawes (1936), and it is recently known that none of these references gave a satisfactory classification.

Tadros (1958) reported the presence of paramphistomes in cows, buffaloes, sheep and camels in Shebin El Kanater district in the Nile Delta, but he did not designate these flukes to known genera or species.

Abdel-Ghani (1960) described specimens, which he identified as Paramphistomum cervi (Zeder, 1790) but his description is not based on sound anatomical and histological features, which are now considered to be necessary for the specific identification of paramphistomes. Also, he described briefly the eggs and miracidia of these flukes.

SYSTEMATICS OF PARAMPHISTOMES

There are various opinions on the systematic position of the conical flukes. Fischoeder (1901, 1902, 1903 & 1904) regarded all paramphistomes as belonging to a single family, the Paramphistomidae Fischoeder, 1901. Stiles and Goldberger (1910) proposed the elevation of the group to the status of a superfamily which included three families : Paramphistomatidae Fischoeder, 1901;