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THE PROTOZOA *HAEMOGREGARINA COLISA* SP. NOV. FROM THE FISH *COLISA FASCIATUS* AND *HAEMATRACTIDIUM* SP. FROM *ARIUS SONA* IN INDIA

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ABSTRACT

Two intraerythrocytic parasites *viz.* *Haemogregarina colisa* sp. nov. and *Haematractidium* sp. are described from *Colisa fasciatus* (Bloch.) and *Arius sona* (Ham.) respectively from lower Bengal. The mature gamonts of *H. colisa* are 8.5 μm by 2.4 μm with an average area of 14.9 μm^2. *Haematractidium* sp. is 4.5×1.0 μm. The *Haematractidium* is reported for the first time from Indian subregion whereas the report of *Haemogregarina* from fishes is treated as third of its kind.

INTRODUCTION

The first piscine haemogregarines *Haemogregarina simondi* from *Solea vulgaris* and *H. bigemina* from *Blennius* spp. caught off the coast of France, were described by Laveran and Mesnil (1901). Thereafter Wenyon (1908) briefly reported another haemogregarine, *H. nili*, from a freshwater fish, *Ophiocephalus obscurus* in the Nile River, Egypt. To date, about 40 species of haemogregarines have been des- cribed from marine fishes and about 20 species from freshwater fishes of the world (Becker, 1970).

The genus *Haematractidium* was established by Henry (1910, 1913a), who described *H. scombri* as the type species from a British sea mackerel, *Scomber scomber*. Since then no further work was done on it until Johnston (1975) found *H. scombri* again and confirmed by electron microscopy that it was a protozoon.

Plimmer (1914) reported the first haemogregarine infection from India in *Trichogaster* (=*Colisa*) *fasciatus*, a freshwater fish, which had been brought to the Zoological Garden, London. Though Wenyon (1926) and Bhatia (1938) mentioned the occurrence of this haemogregarine, neither of them gave a description of this parasite. de Mello and Vales (1937) described *H. thyrsoidea* in the blood of a freshwater eel, *Thyrsoidea macrurus*, from Nova Goa, India ; it is considered to be the first described species of piscine haemogregarine from this subcontinent.

We came across a haemogregarine in *Colisa fasciatus* once again and described it below. In addition, we found a *Haematractidium* sp. in *Arius sona* which is also described below.

Material and Methods

The fishes were collected from the Hooghly river mouth and some freshwater reservoirs near the Sundarban areas of Lower Bengal and some of them were taken to the laboratory for examination. Blood was generally taken after puncturing the branchial blood vessels. Blood and organ smears were made on clean slides and fixed in 100% methanol. All the smears were stained with Romanowsky type stains. Out of 100 examples of *Colisa fasciatus* and 50 examples of *Arius sona* examined, only 1 (1%) and 2 (4%) were found positive for *Haemogregarina* and *Haematractidium* respectively.

The figures were drawn with the help of a Camera-lucida. In each case ten parasites were measured, the mean was calculated and mentioned hereunder.

The type slides will be deposited to the National Zoological Collection of the Zoological Survey of India, Calcutta.

Observation

Haemogregarina colisa sp. nov.

(Figs. 1 a-e)

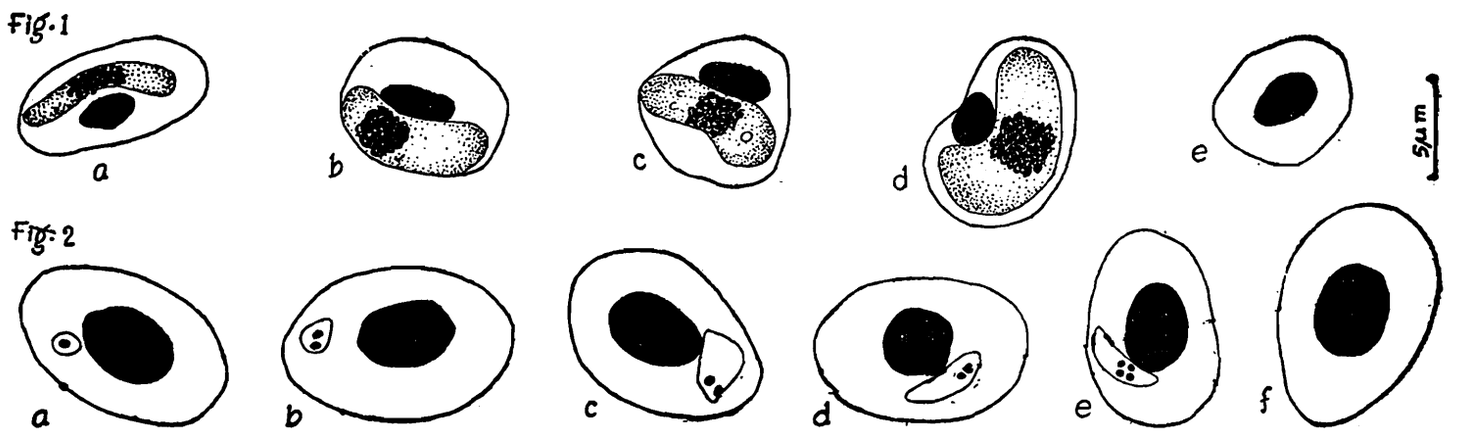
Type-Host	:	*Colisa fasciatus* (Bolch)
Type-locality	:	Reservoir near Canning, 24-Parganas, West Bengal.
Site of infection	:	Erythrocytes.
Vector and life-cycle	:	Unknown
Registration No.	:	Holotype pt. 1982. Paratypes pt. 1983, 1984.

Description

Young gamonts

(Fig. 1a)

The young forms are elongate, with one end broader than the other ; measuring 8.0 μm by 2.0 μm with an area of 14.0 μm^2 (N=10). Each gamont is situated on the half of the erythrocyte facing its concave



Figs. 1 & 2

side towards the convex side of the host cell nucleus.

The cytoplasm is homogeneous, granular and faint blue when stained. The granules are more concentrated towards the poles of the parasite. The nucleus is central tubular, 2.5×1.5 μm with an area about 4.0 μm^2, and stains deep red. The chromatin granules are loosely arranged within a thin non-visible nuclear membrane.

Mature gamonts

(Figs. 1b-d)

The mature gamonts are broad, bean-shaped with both ends rounded ; occupy almost half of the host's erythrocyte either facing its concave border towards the convex side of the host cell nucleus or vice-versa. They are 8.5 μm in length and 2.4 μm in width with an average area of 14.9 μm^2 (N = 10). The cytoplasm is homogeneous and granulated being more granular towards the poles, and stained deep blue. Sometimes 2 or 3 small vacuoles may be found (Fig. 1c) within the cytoplasm. The rounded or band-shaped nucleus is situated at the middle of the parasite and stains deep red. It is vesicular and contains large number of chromatin granules within a clear unstained nuclear membrane.

Effect of the parastite on the host cell :

The infected erythrocytes became very much distorted and disfigured ; they are 8.8 by 6.1 μm with an average area of 35.1 μm^2, being very much hypertrophied. The host cell nucleus is displaced laterally (Figs 1 a, d).

Double infections were never found in an individual blood cell, and there was no indication of schizogony within the cells of the circulating blood.

Uninfected erythrocyte

(Fig. 1e)

N = 10. Cell 7.3 μm by 5.5 μm and 28.7 μm^2 in area. Cell nucleus 2.2 μm by 2.0 μm and 4.0 μm^2 in area.

Haematractidium sp.

(Figs. 2a-e)

Host	: *Arius sona* (Ham.)
Locality	: Hooghly river mouth, Sagar Islands, 24-Parganas, West Bengal.
Site of infection	: Erythrocytes.
Vector and life-cycle	: Unknown

Description—The youngest ring form is a circular minute cytoplasmic body containing a central chromatin granule. It is 1-2μm in diameter. As the parasite enlarges the chromatin granules divides into two or four. The larger forms are elongated or crescent-shaped, situated beside the host-cell nucleus. They are 4.5×1.0 μm. The cytoplasm is clear, non-granular and stains pale blue. The chromatin dots are very minute and stain deep red. The staining properties of the host cells are not detectably changed. There were more binucleate or tetranucleate parasites than mononucleate ones. Double infections in a single erythrocyte was never recorded.

DISCUSSION

A thorough review of the literature on piscine haemogregarines revealed that quite

a large number species of haemogregarines have been described both from marine and estuarine fishes of the world (Laveran & Mesnil, 1901 ; Neumann, 1909 ; Plimmer, 1914 ; de Mello and Vales, 1937 ; Fantham et al., 1942 ; Saunders, 1958, 1964 ; Becker, 1962, 1970).

Nearly all "haemogregarines" occurring in the blood of fishes have been described solely by the observation of various intracellular stages occurring in the peripheral circulation. As a diverse group, these forms display numerous morphological variations, but have the common characteristics of cytoplasm and nucleus.

Current diagnosis of the genus *Haemogregarina* (*sensu stricto*) specifies the occurrence of schizogony in the cells of the circulating blood. However, Becker (1970) clearly believed that organisms described as haemogregarines in the blood of fish are broadly separated into two categories those which undergo schizogony within the blood cells, termed the 'Schizohaemogregarines', and those which have no intra-cellular schizogony (Laird 1952, Saunders, 1958b) at present only single intracellular stages are termed as 'haemogregarine' (*sensu lato*). The present haemogregarine is believed to be latter type.

The present parasite seems to deviate from most haemogregarines of marine fishes (Henry, 1912, Laird, 1952) in lacking a crimson staining polar cap. It can also be differentiated from *H. thyrsoideae* de Mello and Vales (1937) by the presence of elongated young forms and the absence of irregularly vacuolated cytoplasm. The present haemogregarine also has homogeneous granulated cytoplasm with a central vesicular multichromatinated nucleus which is absent in *H. thyrsoideae*. Moreover, the present parasite affects its host cell and host-cell nucleus.

Considering the above facts, it is evident that the species described above is new to science. It is therefore named as *Haemogregarina colisa* sp. nov. The specific name is based on its host generic name.

The genus *Haematractidium* was established by Henry (1910, 1913a) as intraerythrocytic parasite of marine fishes. Subsequently he considered the genus *Haematractidium* an unnamed 'Haemosporidian' (Henry, 1913b). Yet Wenyon (1926) mentioned this genus with Henry's description under 'Intracellular structure of Doubtful nature'. After a long time, Johnston (1973), Newborg and Miller (1975) observed the same parasite in *Scomber scomber* from the U. K. and North America. After studying this parasite both under light and electron microscopes the former clearly considered '*Haematractidium*' to be an eukaryotic protozoon. He also said that, like piroplasms, this organism lies in a parasitophorous vacuole which is not membrane-bound and has a single plasma membrane.

We described *Haematractidium* sp. for the first time in the blood of a catfish, *Arius sona* from India. Due to lack of sufficient material, however, it was not possible to designate the species. Further material is needed for this purpose.

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