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STUDIES ON THE HAEMATOZOA OF SOME CATFISHES BELONGING TO THE GENUS *MYSTUS* SCOPOLI FROM INDIA.

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ABSTRACT

A study on the haematozoa of fishes belonging to the genus *Mystus* Scopoli has been made. As a result two new species viz. *Trypanosoma bengalensis* sp. nov. from *M. bleekeri* and *Cryptobia indica* sp. nov. from *M. vittatus* have been described. A *Dactylosoma* sp. has also been described along with the redescription of *T. vittati* Tandon and Joshi, 1973 from *M. vittatus*. While describing the new species their affinities with the allied species have been discussed. Moreover, a comment on the host specificity of these haemoflagellates have been made.

INTRODUCTION

The present paper is the fifth instalment of the series and deals with the haematozoa of Indian fishes of commercial importance. It includes the description of the parasites harbouring in the different species of the genus *Mystus* Scopoli. In total 38 species are known in the genus *Mystus* of which, 13 are found in India. In this part of this country 6 commercially important species *viz.*, *M. bleekeri* (Day), *M. cavasius* (Hamilton), *M. gulio* (Hamilton), *M. tengara* (Hamilton), *M. vittatus* (Bloch), and *M. menoda* (Hamilton) are readily available, and were examined for the blood parasites. Previously from this genus, only *Mystus vittatus* was reported to harbour a blood parasite viz. *T. vittati* Tandon and Joshi, 1973.

During the course of investigation one new species of *Trypanosoma* form *M. bleekeri*, one new species of *Cryptobia* from *M. vittatus* have been described. In addition, a comment on *T. vittati* Tandon and Joshi, 1973 have been made after obtaining the specimen from *M. vittatus* along with the redescription of the parasite. Moreover, a *Dactylosoma* sp. has also been reported from *M. vittatus* which constitute the new host-parasite record. The type materials will be deposited to Zoological Survey of India, Calcutta.

MATERIAL AND METHODS

The fishes were brought alive from different markets of Calcutta and kept in the Laboratory for examination. The blood smears were normally taken after puncturing the branchial blood vessels. Wright, Leishman and 'Giemsa's stains were used for routine staining. In case of positivity, some organ smears have been prepared and subsequently examined for further observations. But except in the peripheral blood of the host no where the parasites were possible to trace.

About 40 examples of *M. vittatus*, 30 examples of *M. cavasius*, 30 examples of *M.bleekeri*, 60 examples of *M. gulio*, 5 examples of *M. menoda* and 10 examples of *M. tangra* have been examined. Of which, only 4 examples of *M. vittatus* were harbouring *T vittati*, one was harbouring a *Dactylosoma* sp. and 3 were found to be infected with a cryptobian in the blood. Four examples of *M. bleekeri* was positive for trypanosome. Infections in the individual fish were found to be moderate. While conducting routine examination, each slide was observed until all the parasites were located and in each instance about 50 individuals were measured. No parasitimia has been observed in any of the infected individuals reported herein.

Observation

Trypanosoma bengalensis sp. nov.
Fig. 1. A—E

Type Host : *Mystus bleekeri*
Locality - Canning, W. Bengal, India.
Site of Infection : Blood.
Vector and life cycle : Unknown.
Registration No. Holotype pt. 1896
Paratype pt. 1897

Description

The organism is monomorphic, elongated and atenuated at both ends. The configuration generally varies from C to S. Length of the cell body 14 00—17.5 µm (mean 15.5 µm), length of the free flagellum 8.5—12.5 µm (mean 10.5 µm) ; distance from anterior end of the body to the anterior end of the nucleus 5.5—8.5µm (mean 7.5 µm), length of the nucleus 2.00—3.00 µm (mean 2.5 µm) ; width of the nucleus 0.5 µm ; distance from posterior end of the nucleus to the Kinetoplast 4.5—5.5 µm (mean 5.00 µm) ; diameter of the Kinetoplast 0·5 µm—1.00 µm mean 0.75 µm) ; distance from Kinetoplast to the posterior tip 1—1.5µm (mean 1.10µm), width of the undulating membrane 0·5 µm ; maximum width of the cell body 1·5—2.00 µm (mean 1.75 µm).

Cytoplasm : Granular, the granules are arranged along the border opposite to undulating membrane. The matrix of the body cytoplasm stains light blue. Two large vacuoles are found at both extremities of the nucleus.

Nucleus : Elongated, almost bean-shaped, homogenous, placed centrally ; sometimes slightly shifted a little towards the posterior end. It never occupies the entire width of the body.

Kinetoplast : Round, stains deep appearing as dark blue. Normally it does not extend the width of the body where it is situated.

Flagellum and undulating membrane : The flagellum arises from the kinetoplast and trails along the border of the undulating membrane and extends beyond the body as free flagellum. The undulating membrane stains light blue having 3—7 folds. The flagellum is very weak, appears very faint when stained with Leishman, which generally gives very good result for staining the flagella of the blood inhabiting forms.

Diagnosis : The trypanosome is monomorphic, measuring 26.00 µm in total length with a considerable amount of volutin granules in the cytoplasm, concentrated more at the portion anterior to nucleus. Nucleus bean-shaped, generally provided with a vacuolated area at each end. Kinetoplast round, normally does not exceed beyond the width of the body where it is situated. Undulating membrane prominent bordered by a thin flagellum having 3—7 folds.

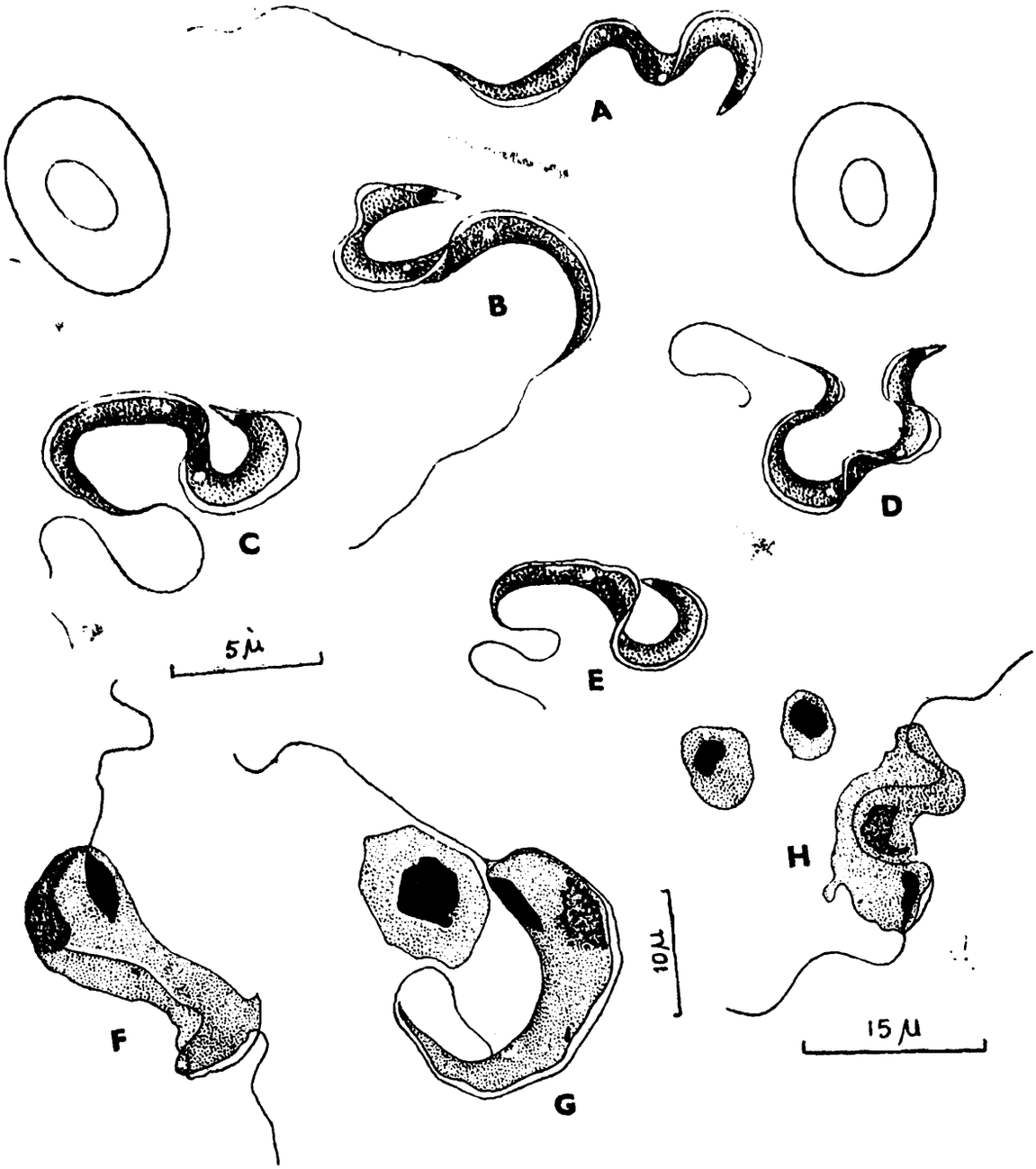

Fig. A—E—*Trypanosoma bengalensis* sp. nov. from *Mystus bleekeri*, F—H—*Cryptobia indica* sp. nov. from *Mystus vittatus*

Remarks : Due to its monomorphic nature, the present species resembles *T.batrachi* Qadri, 1962, *T punctati* Hassan and Qasim, 1962, *T. denileswkyi saccobranchi* Qadri, 1962, *T. parcali* Mandal. 1975, *T. chaudhuryi* Mandal, 1977, *T. anabasi* Mandal (In press) and *T. canicli* Mandal (In press).

It differs from all the species due to the possession of very thin flagellum bordering

the prominent undulating membrane having 3—7 folds. Present species also resembles *T. denileswkyi* duet o the presence of vacuolated areas at both extremities of the nucleus but differs in having the nucleus almost at the middle of the body whereas in the latter it is shifted towards the posterior region. The present species also comes close to *T. cancili* due to thin flagellum but differs in size of the body. The species under consideration is smaller than *T cancili* 18.5—28.5 µm Vs 14.00—17.5 µm / mean 30 µm Vs 26 µm]. Therefore it is evident that the present species is unique in having a thin flagellum, extending the 3/4th of the length of the body as free end and described as *T. bengalensis* sp. nov.

Cryptobia indica sp. nov.
Fig. 1 F—H

Type Host : *Mystus vittatus*
Locality : Champahati, 24-Parganas, West Bengal, India.
Site of Infection : Blood.
Registration Number...Holotype pt. 1898
Paratype pt. 1899

DESCRIPTION

In the living condition the parasite appears like a thick form having 2 flagella, one trails along the margin of the body and other is placed at the anterior end. It is monomorphic, broad, more or less sickle-shaped, measuring 25.00—30.00 µm in length (mean 28.5 µm) and 6.00—10.5 µm in width (mean 8.0 µm). The cytoplasm stains faint blue having fine granules all over the body less so at the posterior region. The nucleus is just opposite to the kinetoplast almost situated anteriorly, reniform or ovoidal in shape, depending apparently on the distortion of specimens. The nucleus measures 5.00—8.5 µm in length (mean 7.5 µm) and 2.5—3.5 µm in width (mean 3.00 µm) and loosely packed with large irregular chromatic mass. The kinetoplast large, oblong or reniform measuring 5.00—6.00 µm in length (mean 5.5 µm) and 0.75 µm—2.00 µm in width (mean 1.5 µm), situated close to the ventral surface towards the anterior end and stained densely pink with Leishman or Wright Stain. In most of the specimens, the kinetoplast lies opposite to the nucleus but sometimes it is seen close to each other. The anterior flagellum measures 21.00—30.00 µm in length (mean 25.00 µm) and the posterior one trails along the margin of the body, forms an undulating membrane measuring 0.25 µm wide and the flagellum then extends as free terminal portion measuring 9·00—12.00 µm (mean 10.5 µm).

Diagnosis : The parasite is broad, measuring 25.00—30.5 µm in length and 6—10.5 µm in width. Nucleus anteriorly placed, just opposite to kinetoplast, reniform or ovoidal in shape measuring 5.00—8.5 µm in length and 2.5—3.5 µm in width. Kinetoplast large situated close to ventral surface towards anterior end. Anterior flagellum large 21.00—30.00 µm in length and the posterior one extends as free portion of 9.00—12.00 µm in length.

Remarks : While discussing the haematozoa of fishes with emphasis on North American records, Becker (1970) has stated clearly about the difficulties in describing the new species of *Cryptobia*. Putz (1972) has brought forward almost similar opinion for describing a species. The taxonomic position of this organism has further vividly been narrated by Becker (1977). Mandal (1978) has discussed about the occurrence of this organism in *Mystus vittatus* from this part of the globe.

From the available literature it appears that most of the species described (about 30 from fresh water fishes) can be broadly

placed under two valid spccies viz. *C. borreli* Laveran and Mensnil, 1902 and *C. salmonistica* Katz, 1951. Accordingly a table (Table 1) has been prepared showing the comparative morphometric variations of the present species along with those 2 species and *C. cataractae*, another species, inhabiting the blood of fresh water fishes. It indicates that the species, reported here in though resembles in shape and other characters like the position of the Kinetoplast and nucleus, with *C. borreli* and *C. salmonistica* but differs from them in having the large size of the body as well as the possession of large anterior flagellum.

Trypanosoma vittati Tandon and Joshi, 1973
Pl. III C.

Host : *Mystus vittaus.*
Locality : Taldi, West Bengal, India.

Tandon and Joshi, 1973 described *T. vittati* after obtaining a *Trypanosoma* from *Mystus vittatus.* It is described as polymorphic *viz.* large and small.

The species encountered by the present author is identified as *T. vittati* but it is monomorphic. The sizc range varies as indica'ed in Table 2, which further substitute

Table 1. Showing the comparative morphometric parameters of the species described and the allied species in micron and mean shown in parenthesis.

	Body Length	Body Width	Length of ant. flagellum	Length of post. flagellum	Length / width of Nucleus	Length / width of Kinetplast
1. *Cryptobia indica* sp. nov.	25-30.5 (28.5)	6-10.5 (8.5)	21-30 (25.00)	9-12 (10.5)	7.5/5	5/1.5
2. C. *borreli* Laveran & Mesnil, 1901	20-25	3-4	..	..	..	..
3. *C. salmositica* Katz, 1951	14.9	2.46	16.05	8.96	1.5/3.5	4.58/0.78
4. *C. catayactae* Putz, 1972	14.7-18.9 (17.)	1.54-2.2 (2)	9.6-13.2	..	..	5-6/.75-2.00

The large size of the body along with long free end of the trailing flagellum and anterior flagellum are unique to the species dealt with. Therefore it is described here as new and named as *Cryptobia indica* sp. nov.

the fact that there is no definite large or small forms as stated earlier but it is monomorphic with some variations in size.

Therefore, the species as such requires

Table 2. Showing the different measurements of *T. vittati* in micron with mean in parenthesis.

1. Length of the cell body 20-35.5, (25.5)
2. Length of the free flagellum 8. 5-14.00 (12.5)
3. Distance from ant. end of the body to the anterior end of the nucleus 9.5-12.5 (10.5)
4. Length of the nucleus 2-4.5 (3.00)
5. Width of the nucleus .7-1.4 (1.2)
6. Distance from post. end of the nucleus to Kinetoplast. ..8.5-11.5 (9.00)
7. Length/width of the Kinetoplast 1.5
8. Distance from Kinetoplast to the post. tip 2.00-3.00 (2.25)
9. Width of the undulating membrane .5-1·5

redescription and described as "Monomorphic, configuration varies from C to S. Body cytoplasm uniformly granular, a little dense towards the portion anterior to the nucleus. Sometimes a few stray small vacuoles are seen throughout the body. Nucleus bean-shaped almost situated at the middle densely compact with chromatin materials, occasionally a clear area is visible at both extremities of the nucleus. The nucleus does not cover the entire width of the body in any of the specimen observed. Kinetopast almost round and always stains deep. Undulating membrane distinct clearly outlined, can be differentiated easily from the body cytoplasm and bordered by the thick flagellum throughout the entire length of the body. The flagellum extends as free portion and beautifully stained with Romanoswky type of stain."

Remarks : Robertson (1908) described *T vittatae* after obtaining a trypanosome from Ceylon tortoise. Without aware of this fact, Tandon and Joshi (1973) described *T. vittati* from *Mystus vittatus*. Though in pronunciation of the specific names both appear same but their spelling is different. According to the International code of zoological nomenclature both the names can run side by side and treated as valid.

Dactylosoma sp.
(Pl. III A & B)

Host : *Mystus vittatus*
Locality : Taldi, West Bengal, India.

Intraerythocitically an organism with granular cytoplasm and a clear nucleus was observed in the one host out of 40 examined. It is placed under the genus *Dactylosoma* Labbe, 1894. The merozoites are 5 in number arranged in the form of fan-shape. Some nuclear divisions have also been observed in the preparation. The specific determination will be made subject to the availibity of some more materials.

Discussion

All the 6 species of *Mystus* examined are the inhabitant of the fresh water bodies except *M. gulio* which is found in estuarine water. However, all the materials used for the present study particularly the 4 species. viz. *M. vittatus M. cavasius, M. bleekeri* and *M. gulio* were procured from the fresh water bodies of lower Bengal.

In total, 175 examples of fishes were examined and 11 were found to be infected (about 6.2%). Only in one occasion, the double infection of blood parasites, viz. *T. vittati* and a species of *Dactylosoma* were found in *M. vittatus*. Mention may be made that *M. vittatus* is the only species to harbour 3 different types of blood inhabiting forms, viz. *Trypanosoma, Cryptobia* and *Dactylosoma*. The parasite belonging to the same genus was not found in more than one instance.

The positivity in *M. vittatus* and *M. bleekeri* with simultenous absence of para-

sites in *M. cavasius* (30 examined) and *M. gulio* (60 examined) from the same ecological niche, are interesting and can be atributed in relation to host specificity. It may so happen that the vector like the leeches may play some important role in transmission of parasites due to their differential host preference. Loam (1973) conducted some experiments and found that no strain appeared to be specific for the host from which it was recorded. Becker (1977) has discussed a lot and stated that the host relationship of piscine haemoflagellats was euryhostpitalic. These haemoflagelletes are rather more vector specific than that of host. However, all the four important agencies, *viz.* the parasite-vector-host and the environments are equally important in determining the host specificity if any in piscine haemoflagellates.

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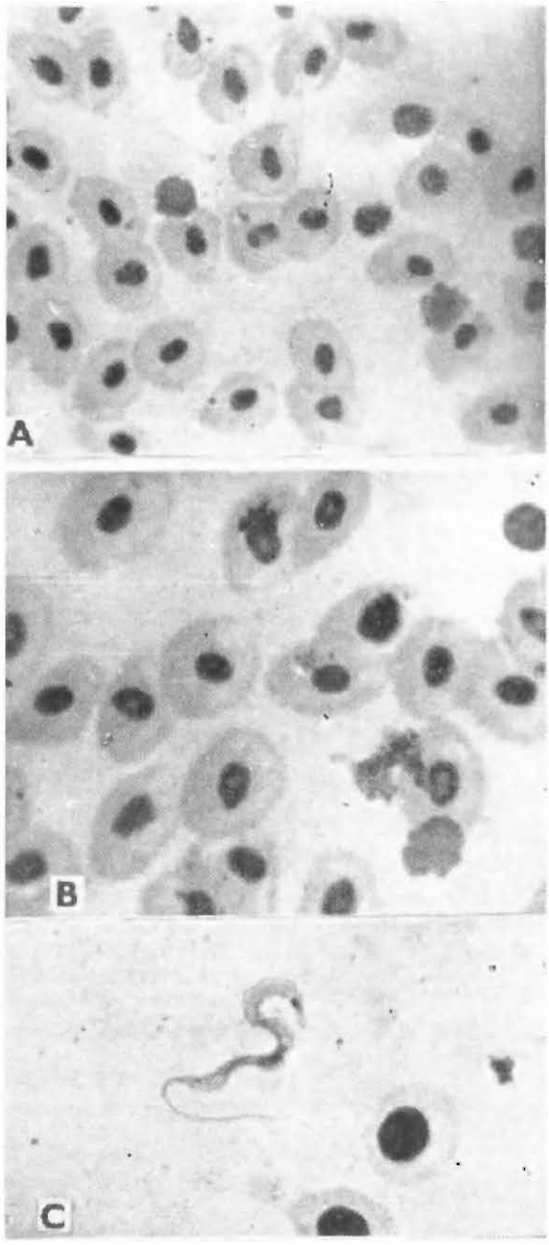

A & B—*Dactylosoma* sp. from, *Mystus vittatus* ; C—*Trypanosoma vittati* Tandon and Joshi from *Mystus vittatus*.