SECTION C
PROTOZOA
The parasitic form of protozoa inflict heavy damage to their hosts which include some of the economically important animals, like fishes, which form the important source of protein for human consumption in our valley. It is mainly due to this reason and also there overall academic value that significant work has been done in different parts of world.


However, only few references are available on the protozoan parasites of aquatic vertebrates of Jammu and Kashmir. ( Malhotra.et. al 1979, kanwar narain, 1988). Some preliminary studies on the par-
Asiatic protozoa of some domestic animals have also been conducted (Das and Shaw 1968, and Shaw and Das 1970). Thus parasitic protozoa is one of the neglected biotic groups in Kashmir valley.

Knowledge of the protozoan parasites of Kashmir is of fundamental importance, both academically as well as economically, so that adequate steps can be taken to cure and control the disease caused by them. Moreover, there is often a tendency for serious outbreaks of the disease caused by protozoans which often cause high mortality in fishes (Haley 1954, Wales, and Wolf 1955, Putz et. al 1965).
MYXOBOLUS
**MYXOBOLUS BUTSCHLI 1882.**

The genus Myxobolus was created by Butschli 1882, with _M. mulleri_ as its type species. Daflein (1899), Auerbach (1910 and 1911), Poche (1913), Davis (1918), Kudo (1919, 1933, 1966), Tripathi (1948), Shulman (1956 and 1966), Meglitsch (1960), and Lom and Nobel (1984) contributed towards the taxonomy and systematics of the genus _Myxobolus_.

Walliker (1968) studied the nature of the iodinophilus vacuole in spores of Myxosporidia using various histochemical tests. Numerous species of _Myxobolus_ have been reported from different parts of the world. Lom and Nobel (1984) reported that genus consists of over 398 species, out of which 308 species possess iodinophilous vacuoles and 87 species are devoid of it. Subsequently several other species have been described by Egusa (1985), Cone and Wiles (1985). In (1987), Al-salmin et al. reported _M. pfeifferi_ from Iraq. Cone et al. (1990) reported _M. carneus_ a new species from Canada and in (1993), Landsberg described _M. centropomii_ a new species from U.S.A.

In Indian subcontinent _Myxobolus_ was first reported by Southwell (1915) from Rasbora daniconius. After him numerous species of _Myxobolus_ with or without Iodinophilous vacuoles were described by different workers.

MYXOBOLUS CATLAE CHAKRAVARTY 1943,

Host : Schizothorax niger,
Location : Gills.
Locality : Anchar lake.

Measurements : (Microns)

Spore:
Length : 16 - 18,
Width : 4 - 6,

Polar capsule:
Length : 11 - 13,
Width : 3 - 7,

Remarks. The present observations on Myxobolus Catlae Chakravarty, 1943, are in conformity with the original description except for the size of spore and polar capsule. A new host is recorded for this parasite. The parasite has been recorded for the first time for this region.
Plate. V.

*Myxobolus catlas* Chakravarty, 1943.

Fig. 1  
Fresh Spores

Fig. 2  
Strained Spores
MYXOBOIDS CENTROPOMI  Landsberg, 1993

Host  =  Schizothorax esocinus
Location  =  Gills.
Locality  =  Dal lake

Comparative measurements (Microns) of M. centropomi and present form.

Particulars  M. centropomi  present form.

Spore:–
Length  8.1–9  7.5–11
Width  4.6–5  7 – 8

Polar capsule:–
Length  3–4  3–4
Width  1–2  1–2
Polar filament  19–39  15–30

Host  Centropomus, undecimalis  Schizothorax esocinus

Remarks.
The present collection has the size ratio of various organelles corresponding to that observed for M. centropomi, to which it is assigned.
Plate VI.

Myxobolus centropomilandsberg, 1993

Fig. 1 & 2. Fresh spores.

Fig. 3. Polar view.

Fig. 4. Giemsa stained spores with extruded filaments.
Myxobolus *venkatashi* Seenappa and Manohar, 1981.

Host. *Schizothorax niger* and *Cyprinus carpio spicularis*

Location : Gills.

Locality : Dal lake and Anchar lake.

Measurements : (microns)

Spore :-

length : 8-11

Width : 6-10

Polar Capsule :-

Length : 3-6

Width : 2-4

Length of polar filament : 22-50

Idodinophilous Vacuole : 3-4

Remarks:- The present collection of parasites is assigned to *Myxobolus Venkatashi* Seenappa and Manohar, 1981, as their morphological features are in conformity with the original description except for size of spore and polar capsules and the shape of capsular nuclei which are not triangular in the present collection. Two new hosts, and also the new locality are recorded for this parasite.
Plate VII.

*Myxobolus Venkateshi* seenppa Manohar, 1981.

Fig. 1. Polar view of spores.

Fig. 2+3. Fresh spores.

Fig. 4. Spore treated with lugols Iodine.

Fig. 5+6. Giemsa stained spore with extruded filaments.
TRICHOINA
TRICHODINA EHRENBERG 1838

The genus Trichodina was established by Ehrenberg (1838) with T. pediculus as its type species, subsequently numerous species of this genus have been described by various workers all over the world.


Tripathi 1954, was first to report Trichodina namely, T. indica from fishes in India. However, Tripathes (1954), work was considered Noman dubium (Loam, 1970b), because he did not make use of Klein's silver impregnation technique which is now considered a prerequisite for studying the trichodinids, subsequently, trichodinids were reported in India, by workers like Devraj (1971), Hagari and Amoji (1979), Haldar and Mukherjee (1981) and Mukherjee and Haldar (1982).
TRICHODINA NIGRA LOM, 1960

Host: Schizothorax niger.
Location: Gills.
Locality: Anchar lake.

The gills of the fish, collected were heavily infected with the parasite. The body of the parasite is circular in oral and aboral view, however, in side view the ciliates appear hat-shaped. The diameter of body ranges from 80-110, microns. The adhesive disc is well developed with 24-26, radially arranged denticles.

Remarks:- The present form resembles Trichodina nigra Lom 1960, to which it is assigned. It shows variation in the diameter of the body (50-95, by Lom 1961, and 80-110 in the present work) and number and denticles (17-33) by Lom, 1961, and 24-26, in present investigation). In India T. nigra was first reported by Mukherjee and Haldar (1982), from the body surface and gills of Nandus nandus and Tilapia mossambica from Kalyani, west Bengal. The present record of T. nigra from the gills of Schizothorax niger is new host record from this region.
Plate. VIII.

Trichodina nigra lom (1960)

Fig. 1&2.
TRICHODINA SP.

Host. Schizothorax niger, S. esocinus and Cyprinus Carpio Spicularis.

Location: Gills.

Locality: Dal Lake and Anchar lake.

In having saucer-shaped body with well developed adhesive disc, provided with rows of Cilia at the circular periphery, the present form is found to be congeneric with Trichodina Ehrenberg, 1838, (Hoffman, 1978). However it could not be assigned to any species due to lack of sufficient material.
Plate IX.

Trichodina sp.

Fig. 1, 2, 3, 4, 5. Trichodina sp.