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# SURVEY OF HELMINTH PARASITES IN FRESHWATER FISHES COLLECTED FROM REGIONS OF TENALI TOWN, GUNTUR DISTRICT, ANDHRA PRADESH, INDIA

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**ABSTRACT**

The occurrence of zoonotic parasites in edible fish are been used to consume daily by the local fisher man families and rural area people collected from the different fresh waters resources like lakes and ponds etc. The presenting results from a survey of helminth parasites of fishes in present investigation was undertaken between July 2009 and April 2011 with an aim to study the helminth parasites associated with different freshwater fishes collected from various places of Tenali Town, Guntur District and Andhra Pradesh. Infection of helminth parasites in freshwater fishes in relation to environmental factors. Fish samples were collected from in and around the Tenali town examined for helminth parasites included three classes i.e. Cestode, Trematode and Nematode. During the present study 343 fishes were examined, in which 11 fishes were infected with six helminth parasites (trematodes), two nematodes and two acanthocephalones. Present studies are helpful for the status of diversity of helminth parasites.

**Key words:** zoonotic parasites, helminth parasites, trematodes, nematode.

## INTRODUCTION

Human activities and natural disasters like earthquakes, floods etc... increased day by day which alarmed the environmental destruction (Knap and Rusyn (2016)). Ecological conditions are being continuously changed results of novel species appearance and ancient might be disappear due to this reason systematic study would be complex to identify the newly formed species characteristics led foundation for the biodiversity studies to initiate significance research findings (Chu and Karr (2017)). Studies and research progress to conduct fauna distribution of species worldwide. As parasites lifestyle has been incredibly successful in the history of life on earth, the efforts and inquisitive talents of parasitologists can make the biodiversity research quite fascinating and appealing (Khurshid Ahmad Tariq (2020)).

In the present study a total of six varieties of fishes were examined for the various metazoan parasites of which total of ten species have been collected and have been concisely listed and described, of these parasites, a digenean, Clinostomum gideoni from Anabas, Euclinostomum from Channa punctatus, Genarchopsis goppo from Channa punctatus, Genarchopsis faruquis from Mastacembelus armatus, Allocreadium handiai from Channa punctatus, Haplorchoides macrones from Labeo rohita, Camallanus unispiculus from Channa punctatus, Paracamallanus from Channa punctatus, Pallisentis ophiocephali from Channa punctatus, Pallisentis colisai from Mastacembelus armatus have been described as parasitic species.

Parasites infection and incidence of fresh water fishes has been contributed by a number of scientists from all over the world. Parasitology of fresh water fishes in India has a long history of almost a century. Since the first report of Isoparorchis hypselobagri dates. It is not much difficult to give the information about the digenetic trematodes of fresh water fishes (Sohn and Na (2018)). Taxonomic work on these digenetic trematodes has flourished throughout the world.

Fairly extensive amount of literature is available on the Nematodes of the Camallanidae from the fishes only to varieties of Nematodes are collected from Channa punctatus belongs to the genus Camallanus and Paracamallanus. However, the vast amount of literature available from various parts of the world cannot be quoted here (Shah; Qayoom; Balkhi and Kumar. (2015)).

The spiny headed worms Acanthocephalans are one of the important parasites of fishes causing serious damage to the hosts. The spiny proboscis of the parasite attaches to the intestinal villi causing severe pathological changes in the fish. Enormous work has been reported from the various parts of the world including India. Only one genera Pallisentis and two species have been collected as adults in fishes (Gautam et al., 2020). Extensive work has done on Acanthocephalans is available till now.

The present study on the taxonomy of metazoan parasites of the fresh water fishes of canals of Krishna River and culture ponds has unveiled the biodiversity of various parasites from the fishes of this dynamic macro habitat and thus also enabled to compile a post parasite list. Such type of studies will fill the lacunae in the field of taxonomy by adding and updating the already existing knowledge with the additional information gathered and enables to prepare data base of parasites in the hosts.

## MATERIALS AND METHODS

**Parasite collection:** Two hundred parasites in total from two species of edible imported Channidae (Sp. A) (n = 103) and Bagridae fish (Sp. B) (n = 18) were collected in McClelland, Michael and Sass, Greg. (2012). for identification in the present study. Table No-1 provides fish details. Collected parasites were stored in 1.5 mL sterile Eppendorf® tubes containing 70% ethanol pending morphological/and or molecular identification in the present study. “Any information which may lead to the identification of an included country has been omitted from the manuscript, auxiliary tables and figures. This information includes country descriptions, fish species names, or citations.”

**Parasite preparation:** Preparation of parasites for morphological examination were according to each morphotype and followed methods described in **Table No-1**. For molecular study of nematodes, a small piece was excised from the mid-body of a representative specimen of each larval nematode as described in Shamsi *et al.,* (2008). The anterior and posterior portion of nematode specimens were slide mounted and cleared with lactophenol. Digenean specimens were removed from 70% ethanol and rehydrated with a 50% ethanol and distilled water series before staining with Semichon's acetocarmine. Specimens were then dehydrated with a graded ethanol series (50%, 70%, 80%, 90%, 95% (twice), absolute (twice)), and cleared with xylene based on the method in Sohn and Na (2018). Cycling time for re/and dehydration was adjusted according to specimen size. Specimens were slide mounted with Canada Balsam.

**Morphological identification:** Selected specimens were studied morphologically and characteristics of importance, following publications in **Table No-2, were Table No-1** Details of fish in the present study measured using an eyepiece micrometre (BX-43 Olympus Microscope, Olympus Corporation, Japan). All measurements are given in millimetres, unless stated otherwise. The range of measurements are given in the format of length x width mm or specified as length or width only. Drawings were made using BX-43 Olympus Microscope, Olympus Corporation, Japan fitted with a drawing tube. Image capture of specimens was conducted using an Upright Motorized Microscope ECLIPSE Ni-E, Nikon, Japan. Morphological description is provided for Isoparorchis sp. and Euclinostomum sp. Due to the poor quality of larval Eustrongylides specimens, molecular method only was used for identification.

**Table No:1- Information of Collected Fish**

| Sl.No | Fish ID | Number of fish | Country of origin | Packaging and fish ~length | Fish details |
|---|---|---|---|---|---|
| 1 | Mastacembelus | 3 | India | Consumer ready but a wide variation of processing standards. Many partially eviscerated and with gills still remaining. Fish frozen in single layer and surrounded with ice. Fish ranged between 9 and 12 cm in length | Primarily freshwater aquaculture or polyculture. Considered voracious, predatory carnivore of small fish and also feeds on worms and insects. Habitat includes stagnant or muddy aquatic environments |
| | Chana punctatus | 3 | India | | |
| | | | India | | |
| 2 | | | | Non-consumer ready. Fish uneviscerated with head and gills present. Fish frozen in single layer and surrounded with ice. Fish were generally uniform in size (~6 cm in length). | Freshwater commercial species which feeds on crustacea, insects, or plant matter. Habitat includes freshwater lowland basins/rivers. |

**Parasite examination and calculations**

The prevalence (P), mean intensity (MI), and mean abundance (MA) of the parasites described in this paper were calculated

following Bush *et al.,* (1997)

P = (Number of infected fish/Total number of examined fish) ×100;

MI = (Number of parasites/Number of infected hosts);

List and number of zoonotic parasites identified from imported fish Species A & B.

## RESULT AND DISCUSSION

A total of 10 parasites species were found in 6 fish species namely Channa punctatus, Catla catla, Labeo rohita, Cirrhina, mrigala, Anabas, Mastacembelus armatus. A total of 343 fish samples were examined for parasites. A total of 10 were observed parasites.

**Table No: 2 Name of the Fish and Number of Fish with parasite**

| S.NO | Date | Name of the Fish and Number of Fish | Name of the Parasite | Number of Parasites Collected |
|---|---|---|---|---|
| 26 | 19.7.2010 | Catla catla---4<br>Anabas---4 | Nil | Nil |
| 27 | 3.8.2010 | Labeo rohita---4<br>Channa punctatus---4 | Nil | Nil |
| 28 | 23.8.2010 | Mastacembelus armatus---5 | Nil | Nil |
| 29 | 20.9.2010 | Channa puntatus---4<br>Catla catla---4 | Nil | Nil |
| 30 | 19.10.2010 | Labeo rohita---4<br>Mastacembelus armatus---3<br>Labeo rohita---5 | Nil<br>Unidentified | Nil |
| 31 | 4.11.2010 | Cirrhina mrigala---5<br>Channa punctatus---5 | Nematode cyst-Larval stage. | 1 |
| 32 | 12.11.2010 | Mastacembelus---3 | Trematodes | 3 |
| 33 | 11.12.2010 | Chana punctatus---3<br>Cirrhina mrigala---3 | Haplorchoides<br>Unidentified | 1<br>2 |
| 34 | 20.12.2010 | Labeo rohita---5<br>Channa punctatus---11<br>Anabas---3 | Nematode cyst-larval stage.<br>Tramatode | 2 |
| 35 | 22.1.2011 | Channa punctatus---10<br>Mastacembelus | Allocreadium handiai | 3 |

| | | | | |
|---|---|---|---|---|
| | | armatus---4 | Trematode | 1 |
| 39 | | Channa | Euclinosto | |
| | 29.1.201 | punctatus---5 | mum | 1 |
| 38 | 1 | Channa | Trematode | |
| | | punctatus---10 | Genarchop | Nil |
| 39 | | Mastacembelus | sis | |
| | | armatus---4 | faruquis | 1 |
| 40 | 14.2.201 | Labeo rohita---2 | Nematode | |
| 41 | 1 | Catla catla---4 | Paracamall | Nil |
| 42 | | Labeo rohita---4 | anus | Nil |
| 43 | 23.2.201 | Mastacembelus | Acanthoce | Nil |
| 44 | 1 | armatus---4 | phalan | Nil |
| 45 | | Labeo rohita---2 | Pallisentis | Nil |
| 46 | 7.3.2011 | Catla catla ---4 | ophioceph | Nil |
| 47 | | Labeo rohita---4 | ali | Nil |
| | 23.2.201 | Cirrhina mrigala -- | Pallisentis | Nil |
| | 1 | --4 | colisai | Nil |
| | | Labeo rohita---2 | Nil | |
| | 7.3.2011 | Cirrhina mrigala-- | Pallisentis | |
| | | --3 | colisai | |
| | 15.3.201 | Catla catla---3 | Nil | |
| | 1 | Catla catla ---4 | Nil | |
| | 22.3.201 | Labeo rohita---4 | Nil | |
| | 1 | Cirrhina mrigala- | Nil | |
| | 28.3.201 | --3 | Nil | |
| | 1 | Catla catla---2 | Nil | |
| | 29.3.201 | Labeo rohita---4 | Nil | |
| | 1 | Cirrhina mrigala- | Nil | |
| | 4.4.2011 | --3 | Nil | |
| | 7.4.2011 | Labeo rohita---4 | | |
| | 8.4.2011 | Catla catla---5 | | |
| | 9.4.2011 | Cirrhina mrigala- | | |
| | | --6 | | |

**Table No:3 NAME AND NUMBER OF FISH HOSTS EXAMINED**

| S.NO | Name of the host | No. of fishes examined | No. of fishes infected |
|---|---|---|---|
| 1 | Channa | 51 + 52 | 2+4 =6 |
| 2 | punctatus | =103 | Nil |
| 3 | Catla catla | 26 +26 =52 | 1 |
| 4 | Labeo rohita | 34 + 38 =72 | Nil |
| 5 | Cirrhina | 46 + 27 =73 | 1 |
| 6 | mrigala | 11 + 7 =18 | 3 |
| | Anabas | 6 + 19 =25 | |
| | Mastacembelus armatus | 343 | 11 |

**Table No: 4. LIST OF PARASITS COLLECTED**

| S. No | Name of the Fish | Name of the Parasite | No. of Parasites Collected |
|---|---|---|---|
| 1 | Anabas | Clinostomum gideoni | 3 |
| 2 | Channa punctatus | Genarchopsis goppo | 2 |
| 3 | Channa punctatus | Camallanus unispiculus | 3 |
| 4 | Channa punctatus | Allocreadium handiai | 2 |
| 5 | Channa punctatus | Euclinostomum | 2 |
| 6 | Channa punctatus | Para camallanus | 1 |
| 7 | Labeo rohita | Haplorchoides macrons | 3 |
| 8 | Mastacembelus armatus | Genarchopsis faruquis | 3 |
| 9 | Channa punctatus | Pallisentis ophiocephali | 1 |
| 10 | Mastacembelus armatus | Pallisentis colisai | 1 |

In the course of routine examination 343 fish species belonging to 22 genera, 5 orders, 7 families found in different localities of around Tenali, Guntur District Andhra Pradesh, were studied for helminth parasites. Out of which only 10 species of fish were found to infect with list of parasites information given in the **Table No: 4.**

1. Metacercaria Clinostomum Gideoni Bhalerao'1942: (**Fig: 1).**

2. Metacercaria Euclinostomum (Rud, 1809) **(Fig: 2).**

3. Genarchopsis goppo (Ozaki, 1925): **(Fig: 3).**

4. Genarchopsis faruquis Gupta, 1951: (**Fig: 4).**

5. Allocreadium handiai pande, 1937**: (Fig:5).**

6. Haplorchoides macrones (Dayal, 1949) Yamaguti, 1958**: (Fig:6).**

7. Nematoda Camallanus unispiculus khera, 1956**: (Fig: 7).**

8. Paracamallanus: (**Fig: 8).**

9. Acanthocephala: Pallisentis ophiocephali (Thapar, 1930) Bayliss, 1933**: (Fig: 9).**

10. Paracamallanus (**Fig: 10**)

**METACERCARIA CLINOSTOMUM GIDEONI BHALERAO'1942**

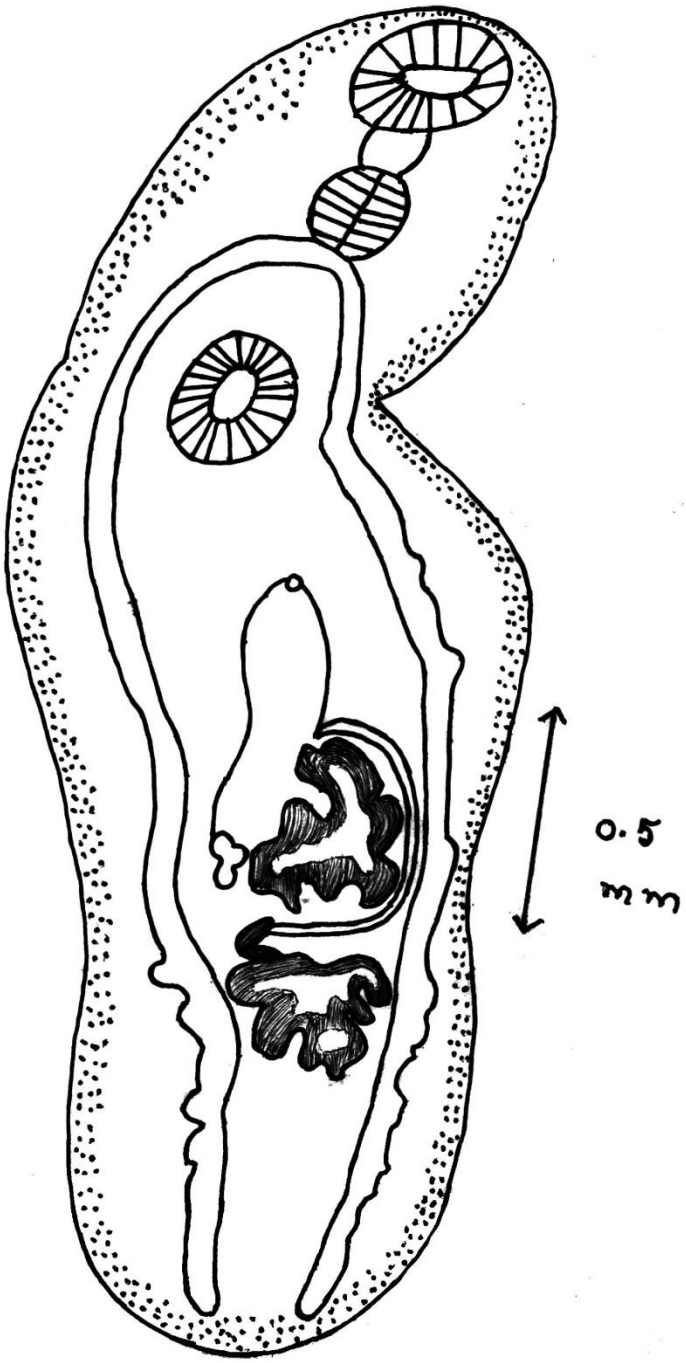


Fig-9

**ALLOCREADIUM HANDIAI PANDE, 1937**

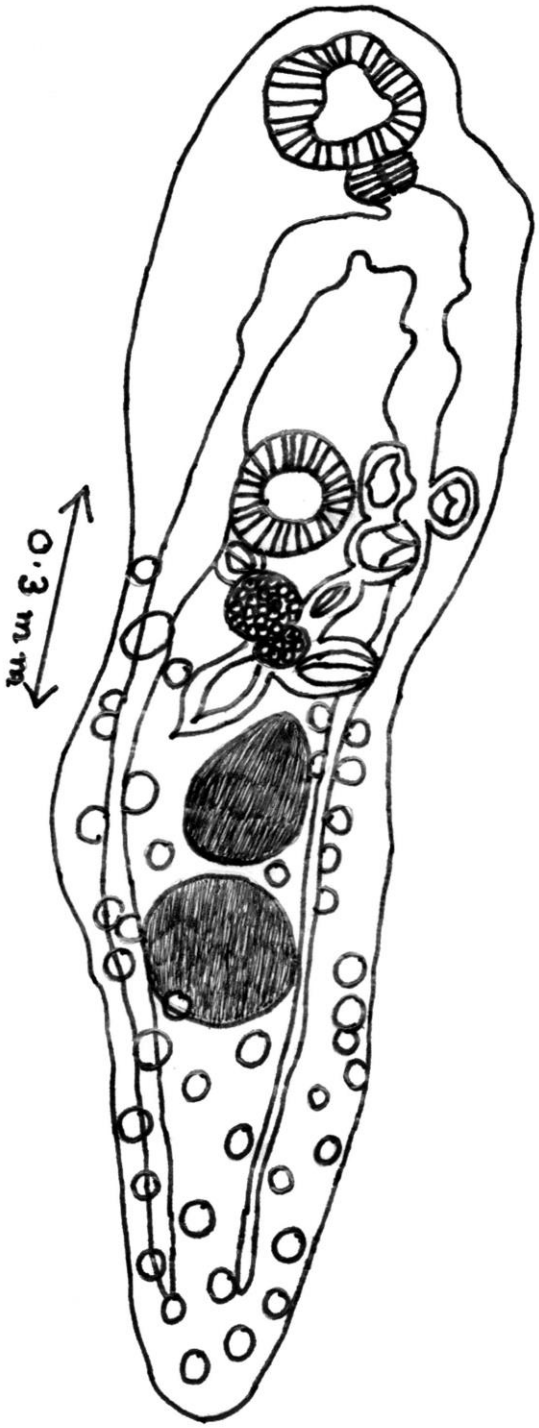


Fig-2

**METACERCARIA EUCLINOSTOMUM (Rud,1809)**

**Travossos, 1928**

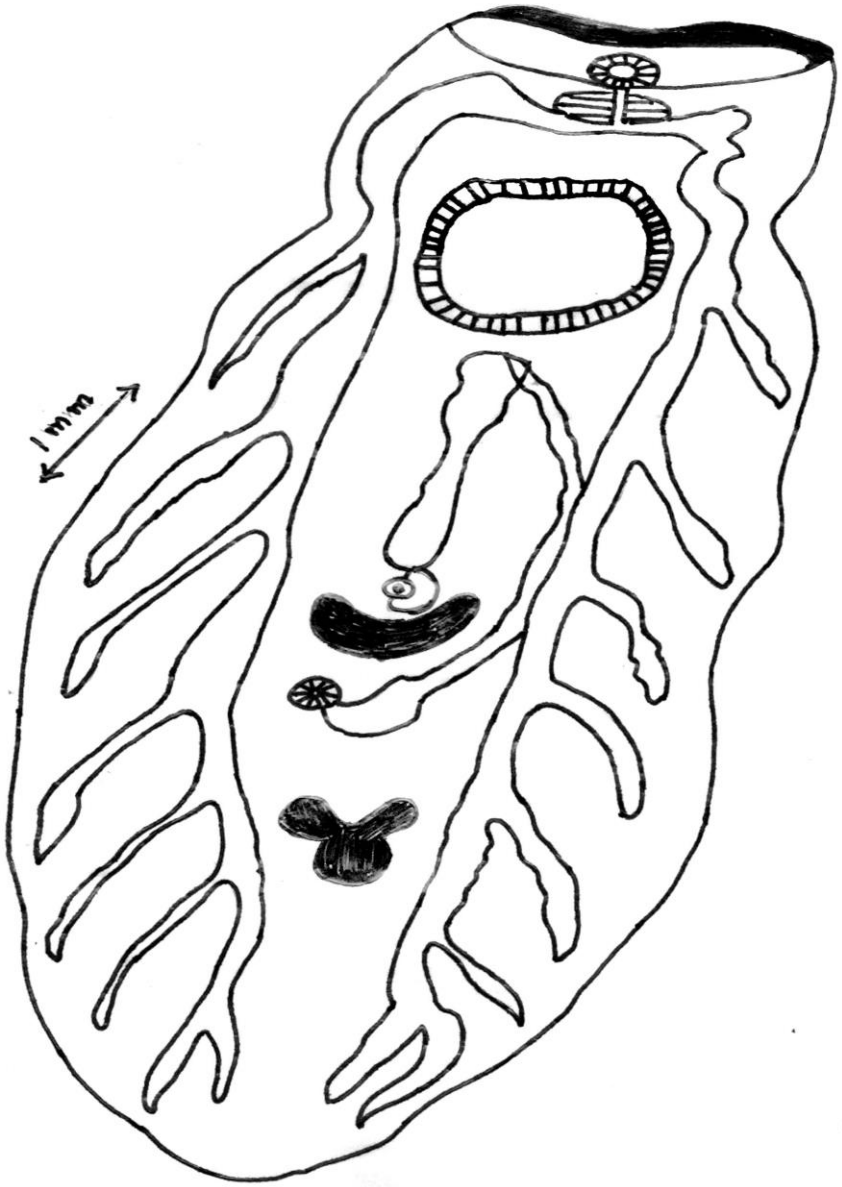


Fig-3

**GENARCHOPSIS GOPPO (OZAKI,1925)**

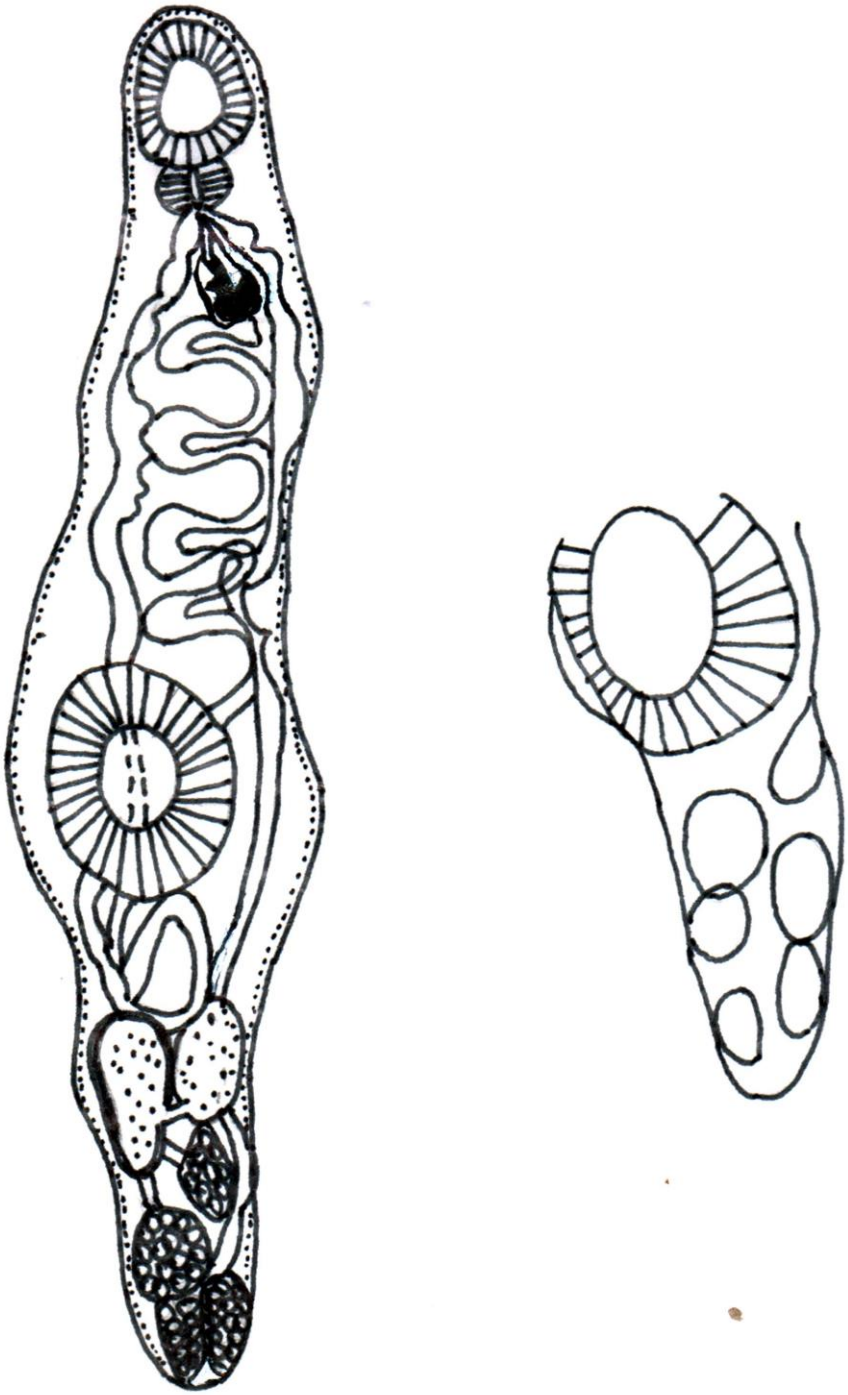

Fig-4

**GENARCHOPSIS FARUQUIS GUPTA, 1951**

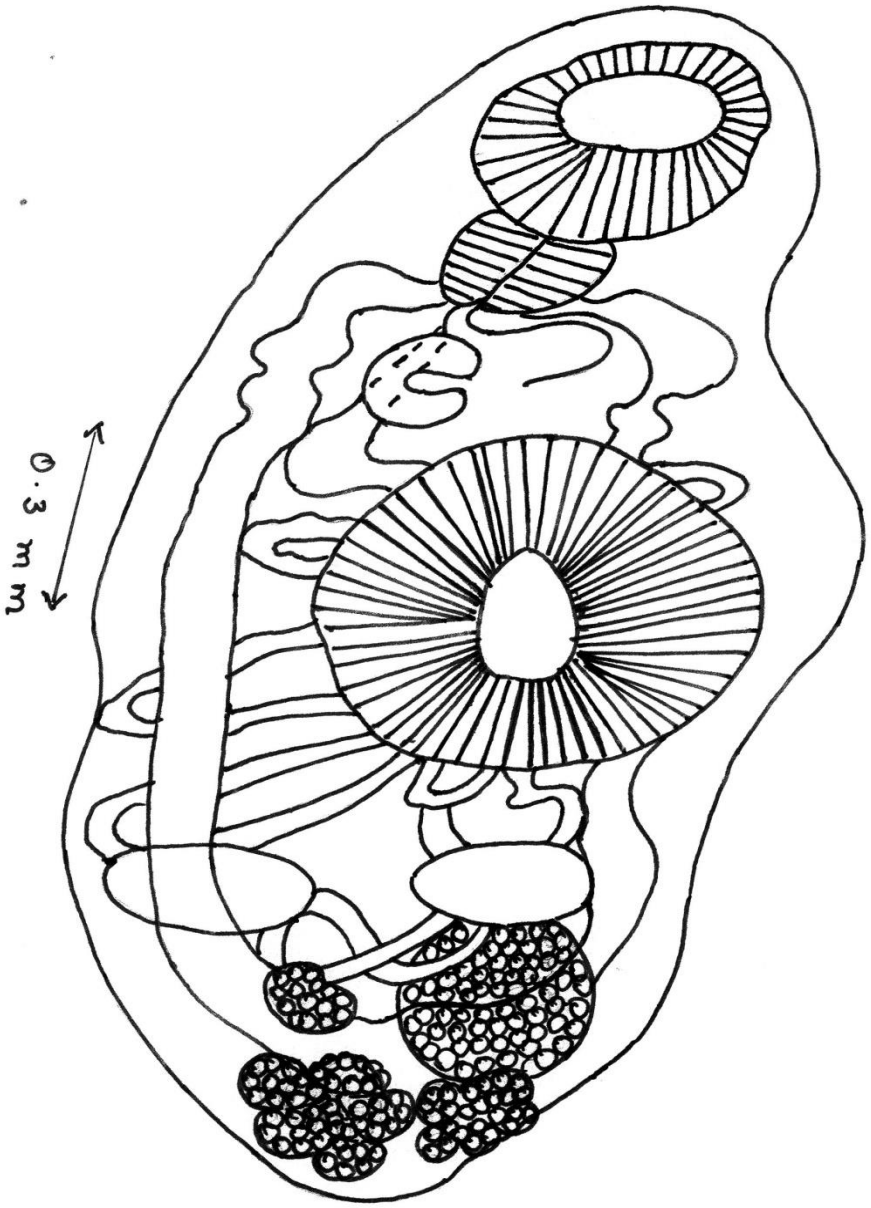


Fig-5

**HAPLORCHOIDES MACRONES (DAYAL, 1949) YAMAGUTI, 1958**

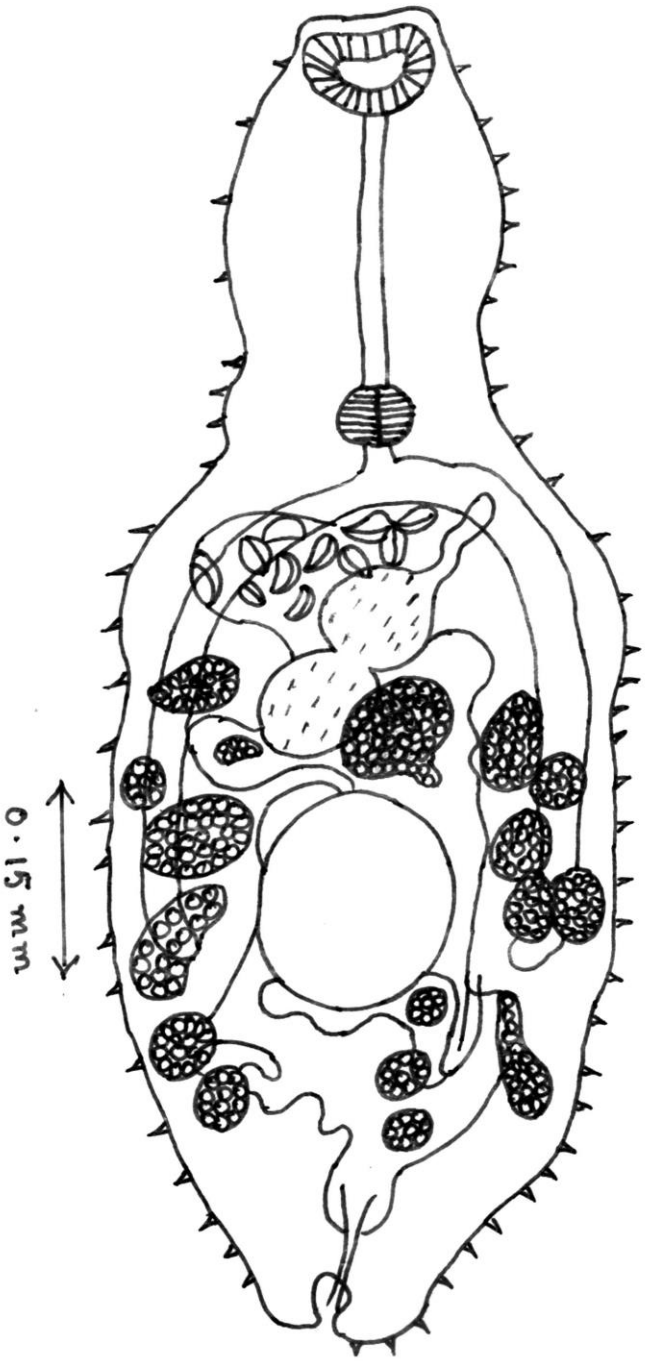


Fig-6

**ACANTHOCEPHALA**

**PALLISENTIS OPHIOCEPHALI (THAPAR, 1930)**

**BAYLISS, 1933**

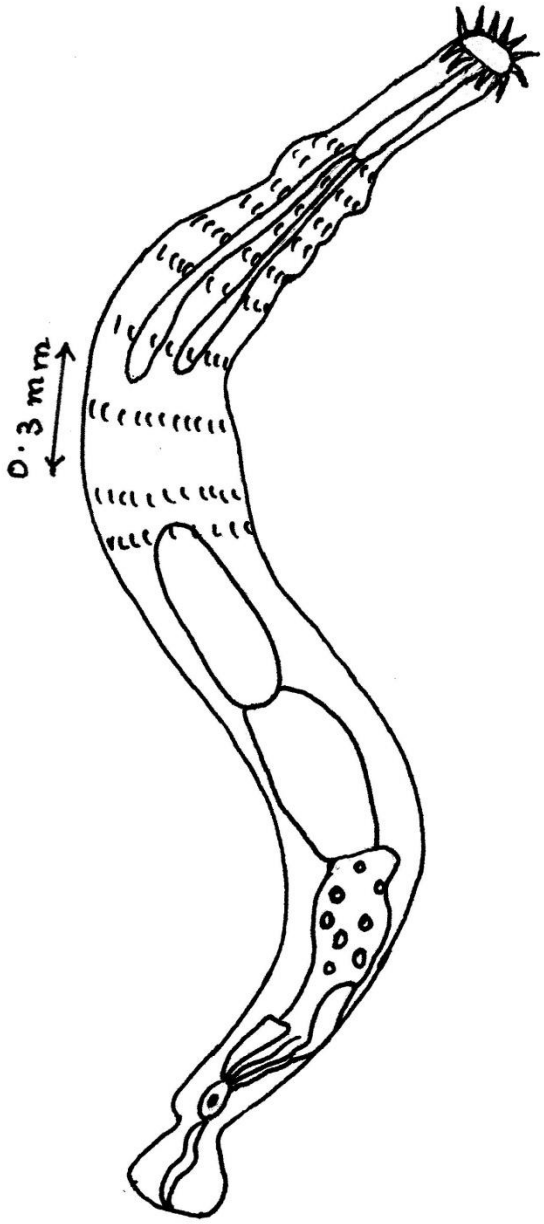


Fig-7

**PALLISENTIS COLISAI - SARKAR, 1954**

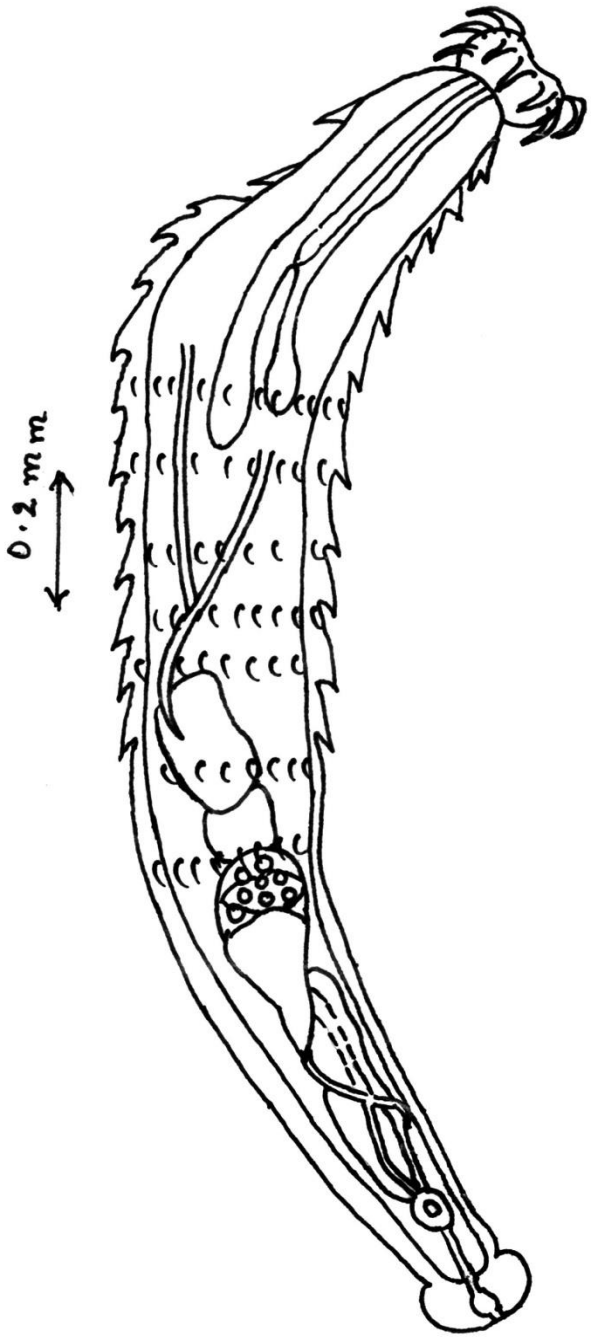


Fig-8

**NEMATODA**

**CAMALLANUS UNISPICULUS KHERA, 1956**

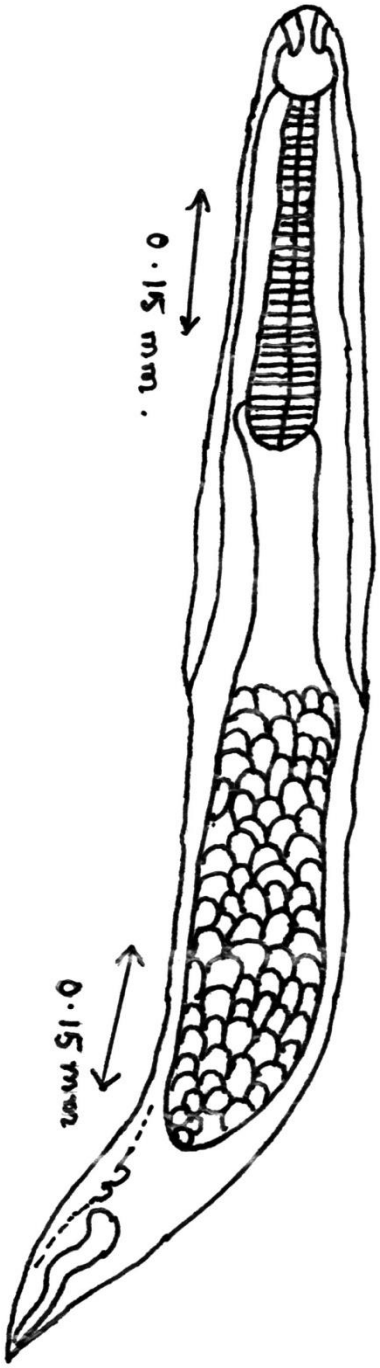

Fig-9

**PARACAMALLANUS**

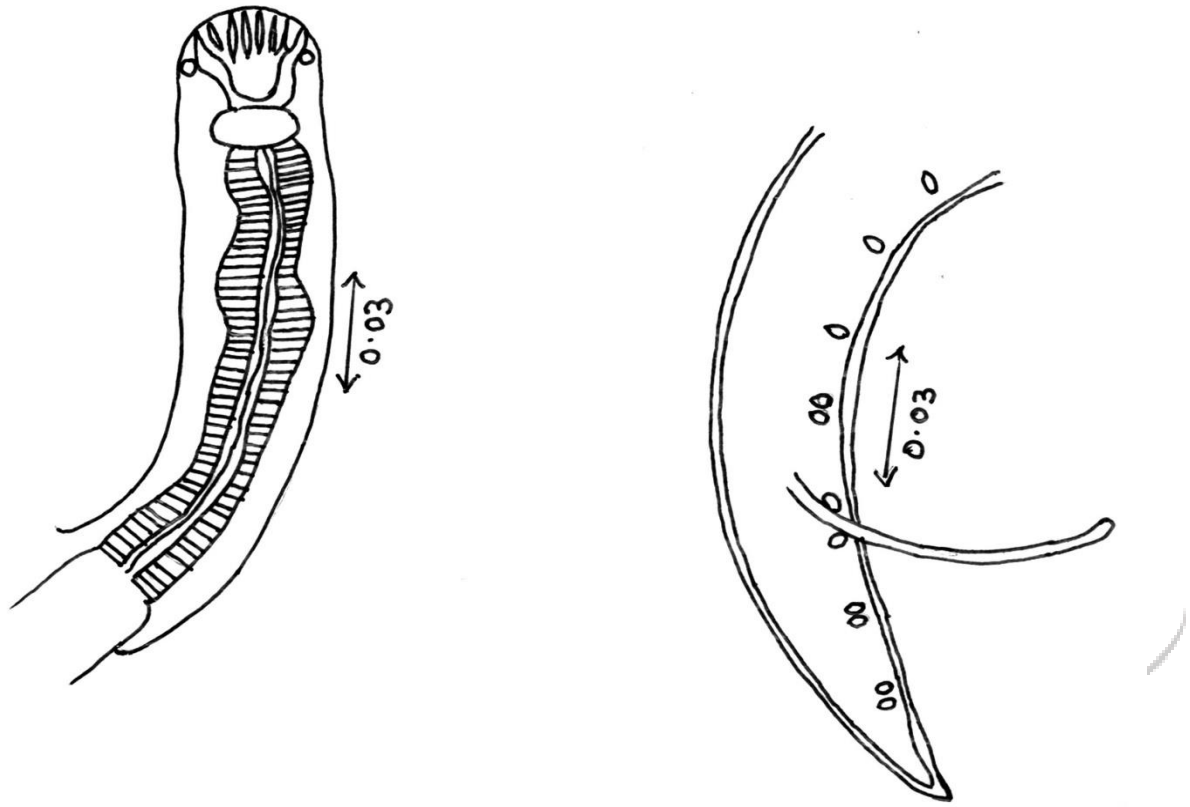


Fig-10

The survey was carried out with 343 freshwater fishes in which *Channa punctatus, Catla catla, Labeo rohita, Cirrhina mrigala, and Anabas and Masta cembelus armatus from various places of Tenali town in and around (*Jyrwa, Donald (2016). Out of 343 fresh water fishes 11were infected with helminth parasites in which cestode, trematode and nematode were found in one annual cycle. A total 21 helminth parasites were found during the present investigation. They were belonging with three classes in

which total seven genera are found, out of them four from cestode (Balai et al., 2017). During the present investigation the high rate of infection of trematode found as compare to nematode parasites. The values for the incidence, intensity, density of infection in **Table No-1** whereas the **Table No-2** shows influence of season on parasitic infection of helminth parasites from freshwater fishes. In the summer and autumn season high rate of infection takes place and also the diversity of parasites and increased trematode population can be seen when compared to nematode (CDC (2019)). The infective stages would attack in the summer and the growth and maturation takes place in during autumn and winter seasons (Burrell et al., 2017). The factors which affect the distribution and environment of the host diet and mode of feeding, often play important role to limit the parasite (Kołodziej-Sobocińska, M. (2019)). Eggs hatching is favorable in the summer season because the temperature and enhances the rate of parasites production but in the case of rainy season found low infection rate (Short et al., 2017).

According to the environmental conditions parasites are get diversified and differentiated or specific differentiation and phylogenetic development as free living animals. The wide external environment surrounding causes the differences but host also acting as the environment (Chang et al., (2019)). The latter produces stimuli which promote further development. Parasites differentiation depends on their host surrounding environment (Muche, et al., 2022). Parasites inhabiting the host organism, in which they form a certain aggregation, the parasitofauna (Tad et al., 2019). Parasitofauna depend upon Ecological parasitology to study the whole changes in the external conditions surrounding the host and on changes in the physiological state of the host (Carlos Rauquea et al., 2018).

Morphological, physiological and ecological factors play important role in the host specificity and parasites are site specific probably derive certain nutrients from the organs (Vanessa Zuzarte-Luís, Maria Mota, (2018)). This needs further investigation to

establish the reasons for organ specificity. Host and parasite organ specificity depends on ecological surroundings of host (Muhammad Moosa Abro *et al.,* 2019).

During this study different variations observed in parasitic infection at different sampling stations. Fish was heavily infected with the cestode and nematode while the other parasites occurred in low numbers or absent (Larry I Lutwick (2019)). Similar results found with fish collected in Aurangabad heavily infected by the cestode parasites (Deshmukh, Shaziya and Gaikwad, (2019)). The variations can be attributed to changes in physico-chemical parameters or variation in food habits of the host (Di Renzo et al., 2020). Fish from more polluted water tend to harbour more helminth parasites than those from less polluted waters (Jasrotia, et al., 2017). Factors determining the variety of parasite fauna the diet of the host, lifespan of the host, the mobility of the host throughout its life including the variety of habitats it encounters, its population density and the size attained, large hosts provide more habitats suitable for parasites (Scholz et al., 2018). Parasites cause diseases and affect the health and reproduction, leads to observable symptoms are fall easy prey to predators and some infect man (Rashid et al., 2019). Economic losses occur due to parasites epidemics and mortalities (Narladkar, B.W. (2018)). The purpose of this survey was to estimate the present status of parasite incidence in this region and to provide parasitologic and epidemiologic information (Jaywant Shivajirao Dhole et al., 2020).

**CONCLUSION:** The Two-year duration the survey had been conducted in the Tenali in and around area fresh water resources. Where that fresh water fishes collected from various ponds, lakes and canals Krishna canals were taken as a source of wide range of parasites especially the helminth parasites. The study was established A total of seven 10 parasites species were found in 6 fish species namely Channa punctatus, Catla catla, Labeo rohita, Cirrhina, mrigala, Anabas, Mastacembelus armatus. A total of 343 fish samples were examined for parasites. A total of 10 were observed parasites.

This study thus highlights on the details of therefore is, the only one that has given some details on the endoparasitic organisms infecting freshwater fish species. Due to seasonal variation generally parasite infection, variation in intensity of infection, variation in parasite fauna with the diet of the host, variation in infection with the habitat type.

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