



## Demographic pattern and digenetic trematode prevalence in *Channa punctatus* of Rohilkhand Region.

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### Abstract:

*Fish is a worldwide food staple and a pathogen host. Most fisheries produce commercially valuable byproducts. Fish have ectoparasitic and endoparasitic diseases. Parasites play an important role in the growth of Fish & other animals. Considering that no systematic work has been done on trematode, and fish diversity of Rohilkhand, there is no record on the impact evaluation of parasitism in the fish trematode Community. Pathogens that cause disease are always present in aquatic environments or on fish. They only become manifest as different fish diseases when the host becomes more vulnerable and allows the pathogen to multiply in the fish body. Attempts have been made to study the biodiversity of trematode parasites linked to fish in various parts of the world.*

**Keywords:** *Channa punctatus*, *Genarchopsis singularis*, Trematode parasite, Demographic pattern & prevalence.

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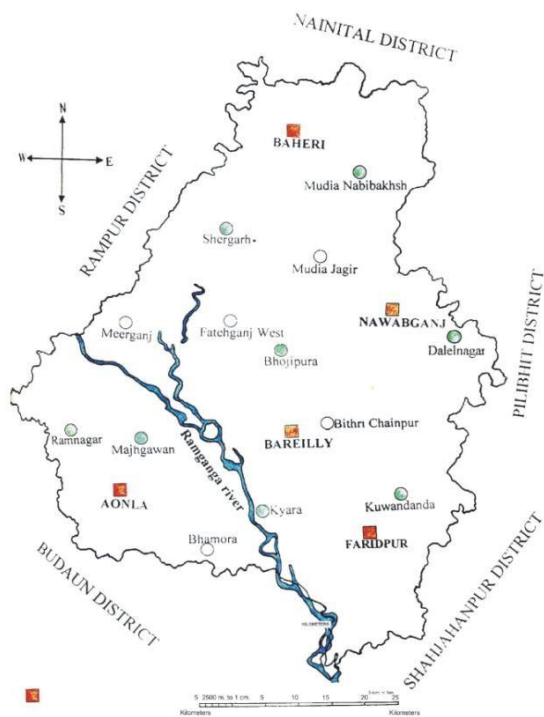
### Introduction:

The variety of vertebrates on earth is greatest among fish. Humans place a lot of value on fishing. The majority of fishing industries produce several byproducts with significant commercial value. For fish to grow, the aquatic environment where they live is crucial. A significant barrier to modern aquaculture is a disease. As aquatic, cold-blooded vertebrates, fish are susceptible to a variety of ectoparasitic and endoparasitic diseases, which can be broadly divided into pathogenic and nonpathogenic origins of diseases. Pathogens that cause disease are always present in aquatic environments or on fish, but they only become manifest as different fish diseases when the host becomes more vulnerable and allows the pathogen to multiply in the fish body. Fish and other animals' growth is significantly influenced by parasites, though the prevalence of parasitism in newborn animals is almost nonexistent. The taxonomy, systematics, and life cycle of digenetic trematode parasites have received a great deal of attention, as shown by freshwater fish. Attempts have been made in recent years to study the biodiversity of trematode parasites linked to fish in various parts of the world. A

systemic study of the diversity of fish trematodes in this area has not yet been conducted, and there is almost no information on the effects of parasitism on demographic factors in the fish trematode community. Some of the Pioneer workers working on digenetic trematodes infecting fishes are – Srivastava & Jauhar (1983), Chopra et al. (1983). Johari and Tripathi (1990). This work on the proposed problem will compare the relationships between abundance and host size in a single trematode species parasitizing different host and in various trematode species parasitizing the same host.

**Topography Of Study Area:**

District Bareilly (Fig.1) is a plain slopping area from North to South but its subdivision Aonla is sloping from West to South. District shows subtropical climates. It falls in the northern temperate zone and is nearer to the tropics, so the Himalayas' hills influence its climate, which is generally cold in winter and hot in summers. In this region, Ramganga is the main river that originates from Garhwal Himalayas and flows from west to east. The river affects the Southern part of the Bareilly district. The river separates Faridpur and Aonla subdivisions. In South, Ramganga receives Nakatia and Deorania rivers. (Table-I).



(Figure : 1) MAP OF BAREILLY DISTRICT SHOWING DIFFERENT COLLECTION SITES SELECTED FOR STUDY

**Table : I Showing the location and selected water bodies of Bareilly region**

	Location	Distance from the main Bareilly city (km)	Type of water body
1	Bareilly	10 Km	River Ram Ganga River Nakatia Chaudhari Pond
2	Nawabganj	28 km	River Bagul
3	Faridpur	20 km	River kailash
4	Aonla	33 km	Rajkiya Matasya Pond
5	Baheri	48 km	River Bhargura

**Table : II General characters of fish collection sites in different of Bareilly regions from Jan. 2016 to Dec. 2017.**

Sr. No.	Various Parametres	RG. R.	N.R.	BHG.R.	Habital Type K.R.	BEG.R	CP	RMP
1	Size	>100 m	>60 m	> 50 m	> 50 m	> 80 m	> 20 m	> 15 m
2	Depth*	0.1-4 m	0.1-2 m	0.1-3 m	0.1-2 m	0.1-3 m	0.5 m	0.6 m
3	Current	Moderate	Slow	Moderate	Moderate	Moderate	None	None
4	Shade	0%	0%	0%	0%	0%	5%	10%
5	Bottom	Sand	Sand	Sand	Sand	Sand	Mud	Mud
6	pH	7.0-8.7	7.3-8.0	7.9-9.9	7.6-8.8	7.9-8.7	6.0-7.0	6.2-7.3
7	Temperature("C)	12.0-27.0	12.5-28.3	13.5-28.2	12.6-27.5	12.8-27.9	12.0-26.0	12.6-27.0
8	DO <sub>2</sub> (mg/l)	5.5-6.0	5.3-6.9	6.3-7.8	6.8-7.9	6.3-7.5	4.4-5.0	4.32-5.31
9	Hardness (mg/l)	290-350	320-	280-310	275-365	250-380	210-	200-

		400			300	295
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RG R : Ram Ganga River, NR, : Nakatia river, BHG. R. Bhargua river, K.R. : Kailash River, BEG, R : Begul river, CP : Chaudhari Pond, RMP Rajkiya Matasya Pond.

**Table : III Showing climatological data of Bareilly district between Jan 2016 to Dec 2017**

Month	Temperature(°C )		Humidity (%)		Rainfall (mm)	No. of Rainy Days
	Minimum	Maximum	Minimum	Maximum		
April	21.87	37.48	25.8	49.2	Trace (less than 0.1 mm)	4
May	25.09	37.99	41.41	63.93	92.1	8
June	26.65	34.43	68.46	80.06	223.4	16
July	25.82	32.84	76.63	95.18	492.5	15
August	26.45	35.13	64.92	90.00	94.8	12
September	24.63	35.73	50.28	82.96	11.5	4
October	19.57	32.10	43.6	88.00	26.2	4
November	14.16	28.91	50.25	87.35	7	1
December	10.61	25.87	62.14	85.09	0.2	1
January	7.23	19.20	71.03	89.50	8.7	3
February	11.2	25.9	50.20	80.35	20.3	4
March	15.40	31.50	35.20	67.00	3.5	2

**Materials & Methods:**

The materials have been obtained from the freshwater fishes of the Bareilly region. The fish were collected from the local fish market at River sits of Ramganga, Nakatia, Begul, Chaudhari ponds, and Rajkiya Matasya pond. For the collection of digenetic trematodes, the fish's visceral organs like the intestine, stomach, liver, kidney, urinary bladder, and heart

were dissected separately in Petri dishes containing 0.7% physiological saline. Then the worms were picked up with the help of a micro-dropper and transferred to a slide to flatten them. The live worms were examined under a microscope, particularly for the excretory system and contents of the cirrus sac. For permanent preparations, the worms were fixed in Bouin's fluid, stained with acetocarmine, cleared in clove oil, and mounted in Canada balsam. All the measurements were taken from the fixed specimens using an acculomirometer in millimeter values in bracket indicate ranges. Sketches were made with the help of a camera lucida. For studies of seasonal variation the fishes were examined throughout the year for the selected species of trematode parasites. At the time of the collection of fishes, the length and weight were measured using a scale and weight machine respectively. All the time of collection of fish, water analysis was also carried out besides gathering information on the type of climate/day, depths of water body, availability of aquatic vegetation extent of clearness of water etc.

The index of invasion (I.I.) was calculated using the following formula.

$$I.I. = \frac{A+B}{100}$$

Where A = Percentage of infection

B = Mean number of worms per host.

The fishes were carefully examined if they were infected and the infected organs were separated and the symptoms related to infection were also noted. The extent of damage to the organs was co-related with the rate of infection by examining the number of worms.

**Table: IV [Parasite Host List]**

Digenetic Parasite	Host	Location
<i>Genarchopsis singularis</i> Srivastava, 1933	<i>Channa punctatus</i> (BI)	Body cavity, stomach,

**Observation: -**

Study of Parasite

1. *Genarchopsis singularis* Srivastava, 1933

Family : Hemiuridae Luhe

Genus: *Genarchopsis* Ozaki

(Syn. *Progonus* Loss, 3)

### Description

Body small, oval, 0.98-3.32x0.49-0.86 with maximum breadth at acetabular zone. Oral sucker oval, subterminal, 0.13-0.33x0.19-0.37. Pharynx oval, 0.08-0.2x0.07-0.10. Oesophagus is small. Testes symmetrical, post acetabular, oval, overlapping intestinal caeca, measuring 0.11-0.21x0.09-0.13 and 0.11- 0.20x0.08-0.17, respectively. Cirrus sac absent. Ovary small, spherical, median, post-testicular, lying in the hind part of the body, anterior to vitelline follicles, 0.067-0.22x0.087-0.16. Shell gland complex post-ovarian. Uterus with transverse coils extending posteriorly up to vitelline zone which continues anteriorly, as Metra term and opens into pars prostatica. Eggs yellowish, oval, 0.021-0.037x0.011-0.015 with the filament on one side. Vitellaria has two, compact, oval glands, one on either side the in posterior most of the body. Excretory bladder Y-shaped with arms anastomosing dorsal to oral sucker.

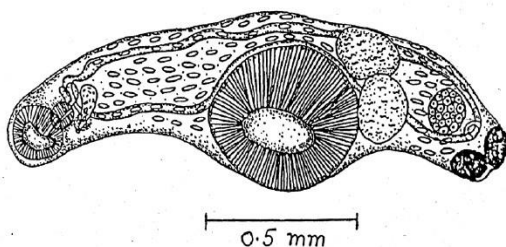


Figure : 2 [*Genarchopsis singularis*]



Figure : 3 [Photograph of collection site]

120 specimens of *Channa punctatus* were collected from the Deorania river. River Ramganga and Rajkiya Matasya Pond, Bareilly. Out of these 34 fishes were found infected with this species. Out of these maximum number of worm collected from a single host were 6.

**Table: V Showing details month-wise incidence of *Genarchopsis singularis* infection in fish. *Channa punctatus* collected from Rajkiya Matasya Pond, Faridpur, Bareilly regiofromng January 2016 to December 2017**

Months	No. of fishes invasion	No. of fishes infected		Percentage incidence of infection based on body weight of fishes			Percentage incidence of infection based on body length of fishes		No of flukes recovered	No of flukes per host	Mean intensity	Index Invasion
		Male	Female	Below 90-120 gm	Above 90 gm	Above 120 gm	Below 10 cm	Above 10 cm				
January	5	1	-	-	20	20	20	20	2	0.40	2.00	0.08
February	5	2	-	-	20	20	40	-	3	0.60	1.50	0.24
March	5	2	1	40	-	-	-	40	4	0.80	1.33	0.47
April	5	1	-	-	20	-	20	-	2	0.40	2.00	0.08
May	5	1	-	20	-	-	-	20	2	0.40	2.00	0.08
June	5	1	-	-	-	20	20	-	1	0.20	1.00	0.04
July	5	-	1	20	-	-	-	20	2	0.40	1.00	0.04
August	5	-	1	-	20	-	20	-	2	0.40	1.00	0.04
September	5	2	-	20	20	-	20	20	3	0.60	1.50	0.24
October	5	2	-	-	20	20	40	-	3	0.60	1.50	0.24
November	5	2	-	20	-	20	20	20	4	0.80	2.00	0.32
December	5	-	-	-	-	-	-	-	-	-	-	-
Total	60	14	3	6.0	6.0	5.0	10.0	7.0	28	-	-	-

## Result and Discussion

Chauhan (1953) in the comprehensive work on the family Hemiuridae maintained the genera Progonous and Ophiocorchis synonyms of the genus Genarches and transferred these species under it. Yamaguti (1958, 1971) synonymized the genus Ophiocorchis Srivastava, 1933 (Progonus Looss, 1899, Preoccupied; Genarches Looss, 1902 Preoccupied) with Genarchopsis Ozaki, 1925. Srivastava (1933) described *Ophiocorchis singularis* from the intestine of *Channa marulius* of Allahabad. Gupta (1951) collected some specimens from *Channa punctatus* at Lucknow and Saharanpur, U.P. and referred them to as new species *Ophiocorchis indicum*. Chauhan (1954) remarked that the differences enumerated by Gupta do not merit the establishment of a new species and the two species should be considered identical. The present specimen has been collected from *Channa punctatus*. Thus, it is evident that *O. indicum* is conspecific with *O. singularis* as suspected by Chauhan (1954). The present collection, however, forms a new locality record. Host : *Channa punctatus* (Bl.)  
 Location : Body cavity, stomach and intestine  
 Locality : Rajkiya Matasya Pond, Faridpur, Bareilly

**Overall Incidence of Trematode Parasite**

**Table : VI Incidence of Trematodes (Jan, 2016 to Dec., 2017)**

Parasite	No. of individual infected	Parasitization percentage rate	Mean no. of parasite per host
<i>Genarchopsis singularis</i>	34	28.33	0.50

**Chi. Square Analysis (Overall)**

**Table: VII Overall Chi. Square Analysis of incidence of Trematods Parasite (Jan. 2016 to Dec. 2017)**

Parasite	X <sup>2</sup> Value
<i>Genarchopsis singularis</i>	9.29

**Table : VIII overall chi-square analysis of seasonal incidence of trematode parasites (January 2016 to December 2017)**



Parasite	X <sup>2</sup> Value
<i>Genorchopsis singularis</i>	3.59

## Conclusion

### *OVERALL CHI-SQUARE ANALYSIS OF INCIDENCE OF TREMATODES (JANUARY, 2005 TO DECEMBER, 2006)*

Table revealed that the Chi-square value of parasites *Genorchopsis singularis*, were found to be 9.29, These value indicated that there parasite distributed normally over the months of the selected time period.

### *OVERALL CHI-SQUARE ANALYSIS OF SEASONAL INCIDENCE OF TREMATODE PARASITES (JANUARY 2005 TO DECEMBER 2006)*

A perusal of Table XI shows that the Chi-square value of parasite *Genorchopsis singularis* were found to be 3.59 for occurrence on their respective host. This value shows a non significant effect of season on the occurrence of parasites on their respective hosts.

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