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Bacterial Microzoobenthos Study of Kunghada Bandh and Chamorshi Lake, Tah. Chamorshi, Dist. Gadchiroli, (India).

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***Abstract*:** *The collection and analysis of Bacterial microzoobenthos were done once in a month during two successive years i.e. February 2012 to January 2014. Total of 5 species of Bacterial microzoobenthos were observed in Kunghada Bandh Lake and Chamorshi Lake belongs from Gram Negative (E. coli, S. typhi, V. cholerae, P. mirabilis, P. aeruginosa). It is concluded that both the Lakes are rich in diversity of Bacterial microzoobenthos. Kunghada Bandh Lake is shows slightly less quantity of Bacterial microzoobenthos as compare to Chamorshi Lake, due to fair quality of water.*

Key words: *Bacterial microzoobenthos, Chamorshi Lake, Kunghada Bandh and Gadchiroli.*

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I. Introduction

Microzoobenthos (Less than 0.1 millimetre or 100 µm) are the type of zoobenthos which cannot be visible to our naked eyes, so we should have to be observing them in microscope under high power (40x and 100x) i.e. Protozoan and bacteria [1,2 & 3].

The littoral benthic micro-organisms of Lakes are divided into different ecological groups. The ooze films group comprises micro-organisms living in and on the film oozes which form the upper surface of the lake bottom. The assemblage of different groups contains microscopic organisms like green algae, bacteria, diatoms, protozoan, rotifers, several entomostracans (mostly cladocera), tardigrades and certain water mites [13&14].

Data available on fresh-water fauna in India are too meagre. The studies on the benthic organisms of fresh-water bodies in India made by various researchers are also of fragmentary nature [6,8,9 & 13]. Therefore, the present investigations were carried out in a freshwater lake at Kunghada Bandh and Chamorshi, Dist. - Gadchiroli, India for the purpose of giving a detailed qualitative and quantitative picture of the bacterial microbenthic organisms and their seasonal fluctuations during the period of February, 2013 to January, 2014.

Kunghada Bandh Lake and Chamorshi Lake are situated at 20.22˚N - 80.01˚E and 19.55˚N - 79.52˚E respectively. The samples were collected monthly for the period of two years (February 2012 to January 2014) and categorized them according to their seasons e.g. 15th February to 15th May-Summer, 15th June to 15th September-Monsoon and 15th October to 15th January -Winter.

II. Material and methods

Benthic organisms were collected from all possible stations in the sterile container by using **Ekman's dredge** and **Van-Vin grab**. Both the dredge are of medium size (6" X 6" X 6"). Samples were collected during 10 am to 12 pm. and analyzed in the same day to avoid any error. The Bacterial microzoobenthos were identified with the help of Various Media, Biochemical Tests, IMViC test and also observed through light microscope and then snapped by Nikon coolpix L 29. The identifications or qualitative study were done by using various keys for Bacterial microzoobenthos[7&8].

Routine and Selective media used for Bacterial Identification

1. **Escherichia coli** (Migula, 1895)
   - EMB Media (Eosin Methylene Blue)
   - Mac Conkey agar
2. **Salmonella typhi** (Schroeter ,1886)
   - Leifson's deoxycholate Cirate agar (DCA)
   - Taylor's Xylose Lysine Deoxycholate (XLD)
   - Selenite F Broth
   - Tetrathionate Broth

3. Vibrio cholera (Pacini, 1854)
- Alkaline Peptone water (pH 8.6) :- Useful for preliminary enrichment of Vibrios from faeces or other contaminated material.
- Thiosulphate citrate bile sucrose (TCBS) agar.
- Monsur's tellurite taurocholate gelatin agar.

4. Proteus mirabilis (Hauser, 1885**)**
- Nutrient agar-Swarming appearance with fishy smell
- Blood agar
- Mac Conkey Broth Purple differential media

5. Pseudomonas aeruginosa (Schröter, 1872)
- Xylose lysine deoxycholate (XLD)
- King's B medium base
- Hicrame VTI agar
- Mac Conkey agar

III. Observations

Table 1 shows Biochemical Tests (Sugars)

Sr. No.	Bacteria	Glucose		Lactose		Mannitol		Sucrose	
		Acid	Gas	Acid	Gas	Acid	Gas	Acid	Gas
01	**E. coli**	Neg (-)	Pos (+)	Pos (+)	Neg (-)	Pos (+)	Neg (-)	Pos (+)	Neg (-)
02	**S. typhi**	Pos (+)	Pos (+)	Neg (-)	Neg (-)	Pos (+)	Pos (+)	Neg (-)	Neg (-)
03	**V. Cholerae**	Pos (+)	Neg (-)	Variable	Neg (-)	Pos (+)	Neg (-)	Pos (+)	Neg (-)
04	**P. mirabilis**	Pos (+)	Pos (+)	Neg (-)	---	Neg (-)	---	Pos (+)	---
05	**P. aeruginosa**	Pos (+)	Neg (-)	Neg (-)	Neg (-)	Neg (-)	Neg (-)	Neg (-)	Pos (+)

Table 2 shows IMViC Test

Sr. No.	Test	E. coli	S. typhi	V. cholerae	P. mirabilis	P. aeruginosa
01	Indole	Pos (+)	Neg (-)	Pos (+)	Neg (-)	Neg (-)
02	Methyl Red	Pos (+)	Pos (+)	Neg (-)	Pos (+)	Neg (-)
03	Voges-Proskauer	Neg (-)	Neg (-)	Neg (-)	Neg (-)	Neg (-)
04	Citrate	Neg (-)	Neg (-)	Pos (+)	Pos (+)	Pos (+)
05	Catalase	Pos (+)	Pos (+)	Pos (+)	Pos (+)	Pos (+)
06	Oxydase	Neg (-)	Neg (-)	Pos (+)	Neg (-)	Pos (+)
07	Co-agulase	Neg (-)	Neg (-)	---	---	Neg (-)
08	H_2S	Neg (-)	Pos (+)	Neg (-)	Pos (+)	Neg (-)
09	Urease	Neg (-)	Neg (-)	Neg (-)	Pos (+)	Neg (-)

Table 3 shows Colony Characteristics and Microscopic Morphological Characteristics

Sr. No.	Characters	E. coli	S. typhi	V. cholerae	P. mirabilis	P. aeruginosa
01	Size	1 to 3 µm	2 to 4 µm	1 to 2 µm	Swarming	1.5 µm
02	Shape	Circular	Circular		Swarming	Circular
03	Color	Colorless to gray	Gray white	Bluish or Greenish appearance in oblique transmitted light	Pinkish	Green
04	Elevation	Low convex	Smooth Convex	------	-----	Raised
05	Margin	Entire	Entire	Serrated	-----	Undulated
06	Surface	Smooth	Smooth	Mucoid	-----	Smooth
07	Opacity	Translucent	Opaque	Opaque	-----	Opaque
08	Gram Staining	Negative	Negative	Negative	Negative	Negative
09	Motility	Motile	Motile	Motile	Motile	Unipolar
10	Microscopic Shape (Morphological)	rod	rod	Comma	Rod	Rod

Table 4 shows Bacterial Microzoobenthos observed in KUNGHADA BANDH during 15/0212 to 14/02/13

S. N.	Genus and species	Summer				Monsoon				Winter			
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
01	Escherichia coli	+	-	-	-	+	-	+	+	+	+	-	+
02	Salmonella typhi	-	-	-	-	+	-	+	+	+	+	+	+
03	Vibrio cholerae	-	-	-	-	-	+	+	+	+	+	-	-
04	Proteus mirabilis	-	-	-	-	+	-	+	+	+	+	+	-
05	Pseudomonas aeruginosa	+	-	-	-	+	+	+	+	+	-	+	+

Table 5 shows Bacterial Microzoobenthos observed in KUNGHADA BANDH during 15/02/13 to 14/01/14

S. N.	Genus and species	Summer				Monsoon				Winter			
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
01	Escherichia coli	-	-	-	+	+	-	+	+	+	+	-	+
02	Salmonella typhi	-	-	-	-	+	+	+	+	+	+	+	-
03	Vibrio cholerae	+	-	-	-	+	+	+	-	+	+	+	-
04	Proteus mirabilis	+	+	-	-	-	+	+	+	-	+	+	+
05	Pseudomonas aeruginosa	-	+	+	-	+	+	+	+	+	+	+	+

Table 6 shows Bacterial Microzoobenthos observed in CHAMORSHI LAKE during 15/0212 to 14/02/13

S. N.	Genus and species	Summer				Monsoon				Winter			
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
01	Escherichia coli	+	-	-	+	+	+	-	+	+	+	-	+
02	Salmonella typhi	+	+	-	-	+	+	+	+	+	-	+	+
03	Vibrio cholerae	+	-	-	-	+	+	+	+	-	+	+	+
04	Proteus mirabilis	-	-	+	-	-	+	+	+	+	-	+	+
05	Pseudomonas aeruginosa	+	+	+	-	+	+	+	+	+	+	-	+

Table 7 shows Bacterial Microzoobenthos observed in CHAMORSHI during 15/02/13 to 14/01/14

S. N.	Genus and species	Summer				Monsoon				Winter			
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
01	Escherichia coli	-	-	-	+	+	-	+	+	+	+	-	+
02	Salmonella typhi	-	-	-	-	+	+	+	+	+	+	+	-
03	Vibrio cholerae	-	-	-	-	-	+	+	+	+	+	-	-
04	Proteus mirabilis	-	-	-	-	-	-	+	+	+	+	+	+
05	Pseudomonas aeruginosa	+	+	-	-	+	+	+	+	-	+	+	+

III. Result and Conclusion

Total 5 species of bacterial microzoobenthos i.e. i) *Escherichia coli* ii) *Salmonella* iii) *Proteus mirabilis* of Family- Enterobacteriaceae, Order- Enterobaceriales, iv) *Vibrio cholerae* of Family- Vibrionaceae, Order- Vibrionales, v) *Pseudomonas aeruginosa* of Family- Pseudomonadaceae, Order-Pseudomonadales, Class- Gammaproteobacteria, Phylum- Proteobacteria were observed and studied during the collection of benthic organisms.

Bacteria are classified primarily on the basis of metabolic capabilities, a time consuming process required for isolation and culture (not always possible) in numerous different media [4 & 10]. Some bacteria can simultaneously utilize both organic and inorganic compounds as an energy sources and bacteria utilizing any given energy source (organic, inorganic or mixed) can utilize any carbon (CO_2, organic compounds, or a mixture of both) source [12]. Cyanobacteria were more resistant to high temperature, attaining optimal growth upto approximately 48^0C. Food webs are detritus based in lake sediments and therefore the bacteria plays a very important role [5]. Freshwater bacteria are at the hub of biogeochemical cycles and control water quality in lakes[7].

IV. Discussion

Pseudomonas aeruginosa were found almost throughout the year while rest were found mostly in monsoon season especially Vibrio cholerae.During the study, bacteria are found less in summer than monsoon and winter. It could be because of increased temperature and decreased water quantity.

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