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INFESTATION OF CERTAIN PARASITES OF MULLET *LIZA TADE* (FORSSKAL)

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ABSTRACT

In order to have an understanding of the nature of infestation, a total of 547 fish (54.7% males and 45.3% females) collected from the two different environments were examined.

Infestation, the indicator of severity of attack has been described in relation to periods, size and sex of the host. A high percentage prevalence (75.87%) was noticed owing to multiple infestation. Among the prevalence reported for different parasites, the infestation due to metacercariae was found to be more (33.52%) while it was less (13.92%) due to adult digeneans. Although no significant infestation was evident among sexes and biotopes, significant difference was noticed among parasitism ($P \geq 0.01$). The environmental influence on infestation and the possible causes for the increased or decreased infestation in host population have been elucidated. The results obtained have been statistically tested to find out the nature of dominance of infestation.

INTRODUCTION

ALTHOUGH numerous investigations have been made on parasitic infestations (Cross, 1934 ; Hunter and Hunter, 1938 ; Woodbury, 1940 ; Sproston *et al.*, 1950 ; William, 1963 ; Paperna and Thurston, 1968 ; Cressey and Collette, 1970), very little information is available on infestation in relation to the condition of fish and environmental parameters. The studies worth mentioning in this context are that of Sproston and Hartley (1941-'43) who examined the infestation rate of *Lernaeocera branchialis* on *Gadus merlangus* and *Gadus pollachius* during their stay in estuaries and nearshore waters and their migration towards offshore waters ; Kabata (1959) who studied the infestation rate in relation to the size and shape of the operculum of three species of flatfishes and Rawson (1976) who examined the relationship of environmental variables to the parasitic populations. In India, studies on the infestation of fish by various parasitic groups have been attempted by certain authors (Gopalakrishnan, 1968 ; Natarajan, 1975 ; Seenappa, 1978 ; Radhakrishnan, 1979). The present study deals with the infestation of different parasites of grey mullet *Liza tade*.

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MATERIALS AND METHODS

For the present study, *Liza tade* were collected from the coastal region of Tuticorin from January to December 1984. Two localities *viz.* one near Korampallam Creek which exhibits a typical brackishwater environment and the other the Pandiyan Tivu, a marine environment,

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were identified for the collection of mullets. Stake nets were employed to collect the samples. To study the nature of infestation, data on the length, weight and sex of the infested and uninfested fish and the number and kind of parasites per host were carefully recorded. Infestation in relation to environments, periods, size and sex of the host were also recorded. The terms ' Prevalence ' and ' Mean Intensity ' as defined by Margolis *et al.* (1982) were used to signify the nature of infestation. 547 individuals of *Liza tade* (54.66% males and 45.33% females) collected both from the brackishwater and marine environments were examined for infestation by different parasites.

TABLE 1. *Prevalence owing to multiple infection in different months in* 1984

Month	No. of fish examined	No. of fish infested	Prevalence (%)	No. of parasites collected	Mean intensity
January ..	60	43	71.67	419	9.74
February ..	74	37	50.00	250	6.76
March ..	53	47	88.68	402	8.55
April ..	41	39	95.12	351	9.00
May ..	45	38	84.44	371	9.76
June ..	40	32	80.00	349	10.91
July ..	39	29	74.36	582	20.07
August ..	36	27	75.00	483	17.89
September ..	40	32	80.00	417	13.03
October ..	38	30	78.95	369	12.30
November ..	40	32	80.00	407	12.72
December ..	41	29	70.73	191	6.59
Total ..	547	415	75.87	4591	11.06

RESULTS

Of the total number of fish examined, 415 fish were found to be infested (75.87%). The prevalence owing to multiple infestation in different months is presented in Table 1. High percentage prevalences were discernible in almost all months except in February which exhibited a low prevalence (50%). The highest prevalence (95.12%) was noticed during April. 4591 parasites were collected, of which the maximum (582) occurred in July and minimum (191) in December. The intensity was minimum in December (6.59) and maximum (20.07) in July. Eventhough high prevalences were evident during summer months, the intensities were only moderate (8.55 to 10.91).

The prevalence and mean intensity of infestation by *Myxobolus* sp., *Ancyclodiscoides* sp., metacercariae, digenea and *Ergasilus* sp. are presented in Table 2. The percentage infestation of *Myxobolus* sp. was found to be minimum (2.22%) in May and maximum (50%) in September. The minimum mean intensity (1) was noticed in May, while the maximum (30) in April. There was no relation between prevalence and mean intensity except in May when both the factors were found to be at their minimum. The prevalence of *Ancyclodiscoides* sp. showed extreme variations (2.74-85.37%) with an exceptionally very high prevalence of infestation (85.37%) in April and minimum (2.74%) in February. The mean intensity

ranged from 2.18 to 21.75. From March to May the prevalences were found to be more, ranging from 45.28 to 85.37% and mean intensity from 6.86 to 11.28. There exists a relationship between the intensity and prevalence from June to August in that the rise or fall in intensity invariably coincided with the rise or fall in prevalence. The intensity showed a peak (21.75) in September and thereafter, it decreased progressively and reached minimum (2.18) in December. Among the parasites reported the infestation of metacercariae followed a characteristic pattern quite different from that of others in that the variation was not found to vary widely. The infestation was heavy in all the months excepting May and October which recorded medium prevalence (13.33 and 15.79% respectively). The maximum mean intensity recorded during January was in accordance with the maximum prevalence in that period. Infestation of digenea was not found in January. The prevalence was minimum in February (1.37%) and maximum (41.67%) in August. The intensity of infestation of digenean was found to be poor ranging from 1 to 4.92. The prevalence exhibited by *Ergasilus* sp. revealed certain noteworthy results. The minimum (8.33%) prevalence was noticed in August while the maximum (56.09%) in April. The prevalence pattern showed an increasing trend from January to April. In May, the infestation dropped drastically to 15.56%. The infestation gained momentum once again in July and thereafter, followed a fluctuating trend. An instance of light prevalence (8.33%) was noticed in August. The intensity and prevalence did not show any relationship. The intensity ranged from 1.33 in January to 4.94 in March and followed no definite pattern.

TABLE 2. *Prevalence (%) and mean intensity of infection by different parasites during* 1984

Month	*Myxobolus* sp.		*Ancyclo-discoides* sp.		Metacercarie		Digenea		*Ergasilus* sp.	
	Prevalence	Mean Intensity	Prevalence	Mean Intensity	Prevalence	Mean Intensity	Prevalence	Mean Intensity	Prevalence	Mean Intensity
January ..	23.33	2.93	—	—	50.00	12.33	—	—	10.00	1.33
February ..	13.70	11.00	2.74	21.50	28.77	3.71	1.37	1.00	12.33	2.00
March ..	9.43	9.40	45.28	7.08	33.96	5.33	7.55	1.25	32.08	4.94
April ..	2.44	30.00	85.37	6.86	39.02	2.06	2.44	2.00	56.09	2.00
May ..	2.22	1.00	55.55	11.28	13.33	9.33	6.67	2.00	15.56	3.71
June ..	20.00	9.38	30.00	11.50	35.00	4.43	27.50	3.73	27.50	3.00
July ..	33.33	16.15	35.90	15.00	38.46	4.67	33.33	4.92	20.51	3.50
August ..	41.67	23.07	22.22	3.88	38.89	3.14	41.67	3.80	8.33	1.67
September ..	50.00	8.90	10.00	21.75	47.50	5.63	35.00	1.79	15.00	3.33
October ..	39.47	14.20	39.47	6.27	15.79	1.50	21.05	1.75	28.95	3.55
November ..	32.50	20.62	37.50	4.53	27.50	3.18	12.50	1.20	32.50	2.31
December ..	29.00	6.92	41.46	2.18	31.71	3.39	2.44	1.00	26.83	2.36

The infestation in relation to sex of the host has been presented in Table 3. The overall percentage prevalences did not show much variation. However, the prevalence was slightly more in females (76.61%) than males (75.25%). The maximum prevalence in males (95.45%) was seen in April and in females the same (94.74%) was observed in April and December. The minimum percentage prevalence in males and females was noticed during December and February respectively. The mean intensity indicated that the infestation was more in males (13.02) than in females (8.74). Further, it is evident that though the percentage prevalence was slightly more in females, the corresponding mean intensity was less than that of males.

TABLE 3. *Infestation in relation to sex of the host in* 1984

Month	Males					Females				
	No. of fish examined	No. of fish infested	Prevalence (%)	No. of parasites collected	Mean intensity	No. of fish examined	No. of fish infested	Prevalence (%)	No. of parasites collected	Mean intensity
January ..	31	20	64.52	168	8.40	29	23	79.31	251	10.91
February ..	38	23	60.53	156	6.78	36	14	38.89	94	6.71
March ..	34	30	88.24	267	8.90	19	17	89.47	135	7.94
April ..	22	21	95.45	220	10.48	19	18	94.74	131	7.28
May ..	25	21	84.00	227	10.81	20	17	85.00	144	8.47
June ..	23	21	91.30	270	12.86	17	11	64.71	79	7.18
July ..	22	17	77.27	475	27.94	17	12	70.59	107	8.92
August ..	18	12	66.67	200	16.67	18	15	83.33	283	18.87
September ..	20	16	80.00	276	17.25	20	16	80.00	141	8.81
October ..	24	18	75.00	284	15.78	14	12	85.71	85	7.08
November ..	20	15	75.00	292	19.47	20	17	85.00	115	6.76
December ..	22	11	50.00	95	8.64	19	18	94.74	96	5.33
Total ..	299	225	75.25	2930	13.02	248	190	76.61	1661	8.74

The infestation in relation to size of the fish is presented in Table 4. The prevalence was found to be maximum (83.33%) in the minimum-length group. A drop (72.38%) in prevalence was however, noticed in the length group 5.1-7.0 cm. In the subsequent length groups (7.0-13.0 cm) the prevalence declined gradually. The intensity increased with increase in length in the initial four length groups and in the

TABLE 4. *Infestation in relation to size of the host*

Length (cm)	Prevalence (%)	Mean Intensity
3.1— 5.0	83.33	8.30
5.1— 7.0	72.38	10.99
7.1— 9.0	79.59	12.12
9.1—11.0	75.00	13.42
11.1—13.0	71.43	8.07
13.1—15.0	75.00	10.42

subsequent length groups such a pattern was not apparent.

The infestation by various parasites according to length group is presented in Table 5. The infestation of *Myxobolus* sp. was found to be low (6.00%) in the minimum length group (3.1-5.0 cm) while maximum (32.00%) in the length group 9.1-11.0 cm. The highest prevalence (57%) of *Ancyclodiscoides* sp. was noticed in the length group 11.1-13.0 cm. In general, the prevalence of *Ancyclodiscoides* sp. was found to be heavy ranging from 23 to 57%. The prevalence showed an inverse relationship with length and it was noticed in the length groups 3.1-11.0 cm while the intensities were in accordance with the increase in length. It is of interest to note the infestation of metacercariae in different length groups. A dominant prevalence was evident (64%) in the minimum length groups. The minimum percentage prevalence (5%) was evident in the length group 11.1-13.0 cm. It is also evident from the Table that the infestation was found to be heavy in almost all the length groups. The maximum intensity was (41.10) observed in the length groups 7.1-9.0 cm. While the minimum (2) in 11.1-13.0 cm length group. An initial increase in the digenean prevalence was noticed with increase in the length group 3.1-9.0 cm. In general, the intensity of infestation did not show any correlation with the length of the host. The prevalence of *Ergasilus* sp. was found to be heavy. The maximum prevalence (31.00%) was noticed in the length group 11.1-13.0 cm. The mean intensity showed an increasing trend with increase in length of the host except in the length group 11.1-13.0 cm.

TABLE 5. *Infestation by various parasites in different length groups*

Length (cm)	*Myxobolus* sp.		*Ancyclodiscoides* sp.		Metacercaria		Digenea		*Ergasilus* sp.	
	P	M.I.	P	M.I.	P	M.I.	P	M.I.	P	M.I.
3.1— 5.0	6.00	5.75	35.00	7.60	64.00	4.98	11.00	1.38	29.00	2.14
5.1— 7.0	21.00	17.05	29.00	7.67	29.00	3.86	12.00	3.29	23.00	2.78
7.1— 9.0	29.00	11.05	29.00	8.53	34.00	41.10	22.00	3.06	19.00	2.79
9.1—11.0	32.00	15.29	23.00	9.90	23.00	7.10	14.00	3.17	27.00	3.33
11.1—13.0	14.00	4.33	57.00	8.50	5.00	2.00	5.00	1.10	10.00	1.50
13.1—15.0	31.00	2.60	44.00	11.43	13.00	5.50	—	—	31.00	4.20

P = Prevalence ; M.I. = Mean Intensity

The infestation in relation to the environments is presented in Table 6. The prevalence was dominant (81.61%) in the Korampallam Creek whereas it was comparatively low (68.95%) in the Pandiyan Tivu. The infestation revealed certain interesting results in that the prevalence showed a gradual decrease in Korampallam Creek from September to November where as in Pandiyan Tivu, the infestation showed a gradual increase during this period. The percentage prevalence during different months of the year in relation to the environments indicated that it was more in the Korampallam Creek in majority of the months. The intensity was distinctly more (14.34) in the Pandiyan Tivu eventhough the prevalence in this environment was found to be less. The

TABLE 6. *Nature of infestation due to multiple infection in relation to different environments in* 1984

Month	Korampallam Creek					Pandiyan Tivu				
	No. of fish examined	No. of infested	Prevalence (%)	No. of parasites collected	Mean Intensity	No. of fish examined	No. of Infested	Prevalence (%)	No. of parasites collected	Mean intensity
January ..	40	29	72.50	377	13.00	20	14	70.00	42	3.00
February ..	42	28	66.67	98	3.50	32	9	28.13	152	16.89
March ..	32	27	84.38	184	6.81	21	20	95.24	218	10.90
April ..	21	21	100.00	161	7.67	20	18	90.00	190	10.56
May ..	23	19	82.61	149	7.84	22	19	86.36	222	11.68
June ..	20	17	85.00	116	6.82	20	15	75.00	233	15.53
July ..	20	18	90.00	358	19.89	19	11	57.89	224	20.36
August ..	21	14	66.67	113	8.07	15	13	86.67	370	28.46
September ..	20	20	100.00	262	13.10	20	12	60.00	155	12.92
October ..	20	18	90.00	116	6.44	18	12	66.67	253	21.08
November ..	20	17	85.00	90	5.29	20	15	75.00	317	21.13
December ..	20	16	80.00	115	7.19	21	13	61.90	76	5.85
Total ..	299	244	81.61	2139	8.77	248	171	68.95	2452	14.34

intensity of infestation recorded from the Korampallam Creek was 8.77.

The infestation by different parasites in relation to environments is presented in Table 7. The percentage prevalence of *Myxobolus* sp. was more (27.02) in Pandiyan Tivu than in the Korampallam Creek (20.13). The prevalence further indicated that it was more in most of the months in Pandiyan Tivu. The monthly percentage prevalence indicated that in Korampallam Creek, it was maximum (75.00%) in September, while in Pandiyan Tivu it was (65.00%) in January. The Pandiyan Tivu and Korampallam Creek recorded curiously the highest and lowest prevalences in January. The intensity clearly indicated its dominance in the Pandiyan Tivu. The monogenean (*Ancyclodiscoides* sp.) prevalence was also more in the Pandiyan Tivu (41.94%). The monthly percentage prevalence revealed that excepting April and October it was dominant in almost all the months in Pandiyan Tivu. The intensity of infestation was distinctly higher (10.17) in Pandiyan Tivu than in the Korampallam Creek. The intensity in relation to different months also indicated that it was uniformly more in all the months except during December which exhibited a meagre difference. The prevalence of metacercariae was specific to the Korampallam Creek. The prevalence and mean intensity noticed in this environment were 61.41% and 5.49% respectively. The digenean infestation was dominant in Pandiyan Tivu (17.34%) than the Korampallam Creek (11.07%). Its mean intensity also showed a higher value (3.47) in Pandiyan Tivu than in Korampallam Creek (2.21). The infestation

TABLE 7. *Infestation of different parasites*

Month	Korampallam Creek									
	Myxobolus sp.		*Ancyclo-discoides* sp.		Metacercaria		Digenea		*Ergasilus* sp.	
	P	M.I.	P	M.I.	P	M.I.	P	M.I.	P	M.I.
January ..	2.50	1.00	—	—	75.00	12.33	—	—	10.00	1.50
February ..	14.63	1.00	—	—	51.22	3.71	—	—	12.20	2.80
March ..	3.13	2.00	25.00	3.88	56.25	5.33	9.38	1.00	40.63	4.00
April ..	—	—	90.48	5.26	76.19	2.06	4.76	2.00	76.19	1.63
May ..	—	—	43.48	7.10	26.09	9.33	13.04	2.00	17.39	4.00
June ..	10.00	4.00	20.00	4.25	70.00	4.43	16.00	1.67	30.00	4.00
July ..	35.00	24.57	25.00	14.60	75.00	4.67	30.00	4.33	20.00	4.25
August ..	33.33	7.00	14.29	2.33	66.67	3.14	19.05	2.00	14.29	1.67
September ..	75.00	8.87	—	—	95.00	5.63	40.00	2.13	10.00	2.50
October ..	40.00	5.38	40.00	2.75	30.00	1.50	10.00	.50	55.00	3.55
November ..	30.00	2.83	20.00	1.75	55.00	3.58	15.00	1.00	60.00	2.33
December ..	35.00	5.14	30.00	2.33	65.00	3.38	—	—	40.00	2.63
Total ..	20.13	7.78	22.48	5.10	61.41	5.49	11.07	2.21	29.53	2.88

P = Prevalence (%) ; M.I. = Mean Intensity

in Liza tade *in relation to environments during* 1984

Pandiyan Tivu									
Myxobolus sp.		*Ancyclo-discoides* sp.		Metacercaria		Digenea		*Ergasilus* sp.	
P	M.I.	P	M.I.	P	M.I.	P	M.I.	P	M.I.
65.00	3.08	—	—	—	—	—	—	10.00	1.00
12.50	26.00	6.25	21.50	—	—	3.13	1.00	9.30	1.33
19.05	11.25	76.19	8.69	—	—	4.76	2.00	19.05	8.00
5.00	30.00	80.00	8.75	—	—	—	—	35.00	2.86
4.55	1.00	68.18	14.07	—	—	—	—	13.64	1.67
30.00	11.17	40.00	15.13	—	—	40.00	4.50	25.00	1.80
31.58	6.33	4	15.22	—	—	36.84	5.43	21.05	2.75
53.33	37.13	33.33	4.80	—	—	73.33	4.45	—	—
25.00	0.00	20.00	21.75	—	—	30.00	1.33	20.00	3.75
38.89	24.29	38.89	10.29	—	—	33.33	1.83	—	—
35.00	35.86	55.00	5.55	—	—	10.00	1.50	5.00	2.00
23.81	9.40	52.38	2.09	—	—	4.76	1.00	14.29	1.67
27.02	**16.94**	**41.94**	**10.17**	—	—	**17.34**	**3.47**	**14.52**	**3.06**

of *Ergasilus* sp. was more (29.53%) in Korampallam Creek than in Pandiyan Tivu. In both the environments the maximum prevalences were noticed during April, while the minimum in different months (January in Korampallam Creek and November in Pandiyan Tivu).

The overall dominance values of different parasites are presented in Table 8. The Table indicated that *Myxobolus* sp., *Ancyclodiscoides* sp., digenea, *Neoechinorhynchus* sp. and *Caligus* sp. were dominant in Pandiyan Tivu while metacercariae and *Ergasilus* sp. were dominant in Korampallam Creek.

TABLE 8. *The overall dominance value of different parasites*

Parasites	Korampallam Creek		Pandiyan Tivu	
	No. of parasites collected	Over all dominance value	No. of parasites collected	Over all dominance value
Myxobolus sp.	467	0.2177	1135	0.4544
Ancyclodiscoides sp.	342	0.1594	1058	0.4235
Metacercaria	1004	0.4681	0	0.0000
Digenea	73	0.0340	149	0.0596
Neoechinorhynchus sp.	5	0.0023	41	0.0164
Ergasilus sp.	253	0.1179	110	0.0440
Caligus sp.	0	0.0000	5	0.0020

Chi-square analyses for the prevalence and mean intensity of infestation among biotopes, sexes and different species of parasites are presented in Table 9. The results revealed that the difference in infestation observed among different parasites was found to be significant at $P < 0.01$. But the difference noticed between the biotopes and sexes was not statistically significant.

DISCUSSION

The individuals of *Liza tade* examined during the present study ranged between 3.1-15.0 cm in body length. The average size at first maturity is 230 mm (Gopalakrishnan, 1972).

TABLE 9. *Chi-square analysis for the prevalence and mean intensity of infestation between biotopes, sexes and different parasitic species on* Liza tade

Particulars		Total	Korampallam Creek	Pandiyan Tivu	x^2	d.f.	Total	Male	Female	x^2	d.f.	Total	*Myxobolus* sp.	*Ancyclodiscoides* sp.	Metacercaria	Digenea	*Ergasilus* sp.	x^2	d.f.
Between biotopes	P%	75.87	81.61	68.95	1.0654	1	—	—	—	—	—	—	—	—	—	—	—	—	—
	M.I.	11.06	8.77	14.34	1.4469	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Between sexes	P%	—	—	—	—	—	75.87	75.25	76.61	0.0123	1	—	—	—	—	—	—	—	—
	M.I.	—	—	—	—	—	11.06	13.02	8.74	0.8340	1	—	—	—	—	—	—	—	—
Between species of parasites	P%	—	—	—	—	—	—	—	—	—	—	75.87	23.26	31.32	33.52	13.92	22.71	174.11*	4
	M.I.	—	—	—	—	—	—	—	—	—	—	11.06	12.61	8.19	5.49	2.92	2.93	15.73*	4

P% = Prevalence; M.I = Mean Intensity; * Significant at P 0.01

While comparing the present data with the size reported for age at first maturity, *Liza tade* examined were not found to be sexually matured. The infestation is influenced by various factors such as the size of the fish, sex of the fish, feeding and spawning behaviour and to a greater extent by the environmental conditions. The prevalence of infestation (Table 1) in the present investigation was found to be very high, ranging from 50.00 to 95.12% which clearly indicates that this species is highly susceptible to infestation. The seasonal infestation suggested that it was more in summer months indicating that the temperature might have played a vital role in the development of certain parasites and their subsequent attack. This is evident from the heavy intensity recorded in June through November. The infestation of all parasites except *Myxobolus* sp. and digenea and the percentage prevalences were more during summer months.

The infestation in relation to sex indicated that the prevalence was more in females (Table 3) while the intensity dominated in males. Wickens and MacFerlane (1972) suggested that dominance of parasites in sex could be correlated with the habits of the sexes during spawning. In the present investigation spawning behaviour of *Liza tade* was not noticed as the matured individuals were not encountered in both the marine and brackishwater environment. Thus in the absence of any conclusive data on its breeding behaviour, the reason for dominance of parasites in sex could not be explained or guessed.

Polyanski (1958) opined that the intensity and prevalence tend to increase with age. In the present investigation, definite conclusion on the influence of infestation on age could not be drawn and this is obviously because of hosts' migratory nature and specific dominance of parasites of that habitat. The juvenile fish (3.1-7.0 cm) on its immigration into the brackishwater and bay region owing to their pattern of movement and feeding around the vegetation along the shallow region could have been subjected to the attack by different kinds of parasites. The increased intensity recorded in the size group (7.1-11.0 cm) indicated the possible longer stay of the host fish in the environment. In the present study, the percentage prevalence and intensity were found to be less and the reason for less prevalence and intensity in such groups may be due to the reduction in the number of certain parasites that might have resulted due to death of the length groups examined might belong to the immigration of a new stock. Rabideau and Self (1953) and Fox (1962) reported that longer the host greater the number and kinds of parasites it harboured. Colley and Olson (1963) and Avault and Allison (1965) reported that intensity of *Posthodiplostomum minimum* metacercariae was a direct function of the length of the fish. Spall and Summerfelt (year not quoted) however reported no relationship of metacercariae with the age of the host. In the present study, the possibilities of increased infestation with size of the host cannot hold good as the host fish seems to migrate to offshore regions for spawning and hence chances are limited for the repeated attack by cercariae which come out from the intermediate host which in the present study possibly be the *Carethidium* sp. that occur in abundance in the shallow regions of the environments studied.

Williams (1963) while studying the infestation of copepod parasites on red fish stated that the copepod *Sphrion lumpi* tend to infest medium sized fish in preference to larger or smaller fish. He however, has not assigned any possible reason for such preference. Rawson (1977) noticed increased intensity and prevalence of crustacean parasite with age of *Mugil cephalus*. Similar prevalence of parasites on size group was also evident in the present investigation. *Ergasilus* sp. and *Ancyclodiscoides* sp. were dominant in the higher length group (11.1-15.0 cm), while *Myxobolus* sp.

and digenea in medium sized fish (7.1-11.0 cm) and metacercariae in the smaller fish (3.1-7.0 cm).

An antagonistic relationship established between the prevalence of *Ancyclodiscoides* sp. and *Ergasilus* sp. in the present study resembled much to the observation of Wilson (1916) and Reshetnikova (1955) quoted by Dogiel *et al.* (1970) who noted this relationship between the gill parasites, glochidia and *Ergasilus* sp. on write carppie and *Ancyrocephalus vanbenedenii* and *Ergasilus nanus* respectively.

Polyanski (1958) suggested that the change in parasitic composition might possibly be due to the changes in the habitat or behaviour of the host. This is well exhibited in the infestation of *Liza tade* which often harboured different kinds of parasites and their dominance depends mainly on the nature of the parasitic species. *Ergasilus* sp. and metacercariae were dominant when the host fish stay in the brackishwater environment while *Myxobolus* sp., *Ancyclodiscoides* sp., digenea and *Caligus* sp. occur abundantly when the fish inhabits the bay region. Overall dominance of parasites as presented in Table 9 would be a clear indication of this phenomenon. The infestation in relation to environments indicated that the percentage prevalence was dominant in Korampallam Creek, the heavy incidence of metacercariae and *Ergasilus* sp. might have contributed for such a dominance of prevalence in this region. The reason for less intensity in Korampallam Creek may probably be due to the less survival of free swimming stages of *Ergasilus* sp. for which salinity could be a limiting factor. The absence of metacercariae in the marine environment also indicated the impact of salinity on the distribution of larval metacercariae. The influx of sea water might have a direct bearing on the reduction in the number of metacercariae on host fish in the brackishwater environment.

Spall and Summerfelt (year not quoted) have correlated the abundance of parasites with the water temperature since favourable water temperature helps the multiplication and development of cercariae in snail which are the intermediate hosts for these parasites. In the present investigation also the dominance of metacercariae was noticed from June to September, a period of high water temperature and the prevalence ranged from 35.00 to 47.50% (Table 2).

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