

DIURNAL VARIATIONS IN ABUNDANCE OF PENAEID PRAWN POSTLARVAE  
AT ENNORE ESTUARY NEAR MADRAS

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ABSTRACT

During the years 1983 and 1984 collections of penaeid prawn postlarvae were made by Renfro net at night and day near the bar mouth during the four phases of the moon. An analysis of the data revealed that the number of postlarvae was more during the nights on 91% of the observed days in the first quarter, 81% of the days on new moon, 75% of the days in the last quarter and only 60% of the days on full moon. Number of postlarvae collected was usually more in the mornings of full moon rather than at nights. It was noticed that the day collections were generally richer during October and November in all the phases of the moon. Details of abundance of penaeid prawn postlarvae of various species in relation to diurnal and lunar phases are discussed in the paper.

INTRODUCTION

GARCIA AND LE RESTE (1981) have summarised that whatever may be the gear the number of postlarvae observed is almost always higher at night than in the day time. This is the general pattern of occurrence with some exceptions on certain occasions. In India Subrahmanyam and Rao (1970), Subrahmanyam and Ganapati (1971), Goswamy and George (1978), Ramakrishnayya (1979) and Kuttayamma and Kurian (1980) have made some observations on the diurnal variations in abundance of penaeid prawn postlarvae.

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MATERIAL AND METHODS

Regular weekly collections of postlarvae were made during 1983 and 1984 by operating Renfro net along the bank of the Ennore Estuary at 6 A.M. and 10 P.M. during the four phases of the moon. The details of the net and the mode of collection are given by James and Thirumilu (in press). The Renfro net is slightly modified for greater efficiency. The net is dragged along the bank of the estuary to a uniform distance of 50 metres against the current. Care is taken to see that the water in front of the net is not disturbed by persons making collection which will not only disturb the postlarvae, but will also bring in lot of sand or mud into the net.

RESULTS

The number of postlarvae collected during the four phases of the moon during day and night per each haul are given in Tables 1-4. During the new moon, collections were made on 20 occasions each in 1983 and 1984. Only

TABLE 1. Number of penaeid prawn postlarvae collected during day and night on new moon during 1983 and 1984

Months		PI	PM	PS	P. MER	PJ	MD	MM	Total
January 1983	D	—	—	—	—	—	8	—	8
	N	4	—	—	—	—	35	3	42
February	D	5	—	—	—	—	—	—	5
	N	139	—	—	—	—	4	15	158
March	D	Collection not taken							
	N	Collection not taken							
April	D	Nil							
	N	16	—	6	—	—	3	—	25
May	D	—	—	—	—	—	23	8	31
	N	1	—	3	—	—	48	2	54
June	D	Nil							
	N	—	—	1	—	—	—	—	1
July	D	Collection not taken							
	N	Collection not taken							
August	D	12	—	—	—	—	—	2	14
	N	1	—	—	—	—	1	—	2
September	D	—	—	—	—	—	—	5	5
	N	20	—	—	—	—	—	1	21
October	D	35	—	—	—	—	—	—	35
	N	Nil							
November	D	102	21	—	—	—	—	—	123
	N	2	3	—	—	—	—	—	5
December	D	—	1	—	—	—	—	—	1
	N	3	2	—	—	—	—	—	5
January 1984	D	Nil							
	N	15	—	—	—	—	—	—	15
February	D	—	—	—	—	—	2	—	2
	N	10	3	—	—	1	11	—	25
March	D	12	—	—	—	—	1	—	13
	N	5	—	—	—	—	1	—	6
April	D	4	—	—	—	—	12	—	16
	N	3	—	—	—	—	88	—	91
May	D	9	—	—	—	—	6	—	15
	N	24	—	8	—	3	140	8	183
June	D	18	—	—	—	1	—	—	19
	N	2	—	—	—	—	18	5	25
July	D	1	—	—	—	—	—	—	1
	N	6	—	—	—	—	1	—	7
August	D	10	—	—	—	—	3	—	13
	N	4	4	—	—	—	6	—	14
September	D	Nil							
	N	1	1	—	—	—	11	4	17
October	D	Collection not taken							
	N	Collection not taken							
November	D	6	—	—	—	—	1	—	7
	N	—	1	—	—	—	—	—	1
December	D	Collection not taken							
	N	Collection not taken							

PI — *P. indicus*; PM — *P. monodon*; PS — *P. semisulcatus*; P. MER — *P. merguensis*;  
 PJ — *P. japonicus*; MD — *M. dobsoni*; MM — *M. monoceros*; D — Day; N — Night

TABLE 2. Number of *penaeid* prawn postlarvae collected during day and night on first quarter during 1983 and 1984

Months		PI	PM	PS	P.MER	PJ	MD	MM	Total
January 1983	D	1	—	—	—	—	2	—	3
	N	—	—	—	1	—	—	—	1
February	D	110	—	—	—	—	37	—	147
	N	46	—	5	—	2	106	—	159
March	D	2	—	—	—	—	—	—	2
	N	13	—	—	—	—	—	—	13
April	D	Nil							
	N	6	—	—	—	—	6	—	12
May	D	2	—	—	—	—	1	—	3
	N	1	—	—	—	—	25	4	30
June	D	1	—	—	—	—	—	—	1
	N	3	—	—	—	—	—	2	5
July	D	Collection not taken							
	N	3	—	—	—	—	5	1	9
August	D	2	—	—	—	—	113	—	115
	N	8	—	—	—	—	1309	20	1337
September	D	2	—	—	—	—	—	—	2
	N	43	—	—	—	—	—	—	43
October	D	5	—	—	—	—	1	—	6
	N	1	—	—	—	—	—	—	1
November	D	2	—	—	—	—	—	—	2
	N	15	1	—	—	—	—	—	16
December	D	8	—	—	—	—	—	—	8
	N	11	—	—	—	1	4	3	19
January 1984	D	19	—	—	—	—	1	—	20
	N	101	2	—	—	2	62	7	174
February	D	22	—	—	—	—	—	—	22
	N	21	—	—	—	—	5	—	26
March	D	Collection not taken							
	N	Collection not taken							
April	D	10	—	—	—	—	4	—	14
	N	80	—	1	—	—	—	—	81
May	D	37	1	1	—	—	4	—	43
	N	43	—	1	—	—	15	1	60
June	D	4	—	—	—	—	56	—	60
	N	3	—	—	—	—	631	7	641
July	D	135	—	—	—	—	22	—	157
	N	45	—	—	—	—	339	—	384
August	D	31	—	—	—	—	2	1	34
	N	64	1	10	—	8	228	—	311
September	D	7	—	—	—	—	3	—	10
	N	2	—	—	—	—	4	7	13
October	D	6	—	—	2	—	2	3	13
	N	7	6	2	1	—	55	2	73
November	D	8	1	—	—	—	—	—	9
	N	70	3	—	—	1	8	—	82
December	D	6	—	—	—	—	—	—	6
	N	30	—	—	—	6	—	—	36

NOTE: For abbreviations, please see Table 1.

TABLE 3. Number of penaeid prawn postlarvae collected during day and night on full moon during 1983 and 1984

Months		PI	PM	PS	P.MER	PJ	MD	MM	Total
January, 1983	D	2	—	—	—	—	—	—	2
	N	Nil							
February	D	10	—	—	—	—	5	—	15
	N	58	—	4	5	2	53	5	127
March	D	9	1	—	—	—	20	4	34
	N	2	1	—	—	—	—	—	3
April	D	Nil							
	N	1	—	1	—	4	3	2	11
May	D	Nil							
	N	—	1	—	—	—	8	5	14
June	D	3	—	—	—	—	9	—	12
	N	—	—	—	—	—	4	—	4
July	D	1	—	—	—	—	—	—	1
	N	1	—	—	—	2	5	—	15
August		Collection not taken							
September		Collection not taken							
October	D	Nil							
	N	Nil							
November	D	9	1	—	—	—	—	—	10
	N	Nil							
December	D	15	—	—	—	—	—	—	15
	N	2	—	—	—	—	—	—	2
January, 1984	D	1	—	—	—	—	4	1	6
	N	1	—	—	—	—	3	—	4
February	D	46	3	—	—	—	—	—	49
	N	2	—	—	—	—	—	—	2
March	D	1	—	—	—	—	—	—	1
	N	6	—	—	—	1	15	2	24
April		Collection not taken							
May	D	18	—	—	—	1	9	1	29
	N	15	—	1	—	3	18	7	44
June	D	9	—	—	—	—	—	—	9
	N	1	—	—	—	—	8	3	12
July	D	—	—	—	—	—	11	—	11
	N	3	—	—	—	—	135	—	138
August	D	24	—	—	—	—	92	—	116
	N	13	2	—	—	2	120	—	137
September	D	—	—	—	—	—	1	—	1
	N	4	—	—	—	—	26	4	34
October	D	155	5	—	—	—	1	—	161
	N	7	—	—	—	—	—	1	8
November		Collection not taken							
December	D	2	—	—	—	—	—	—	2
	N	21	—	—	—	—	6	—	27

NOTE: For abbreviations, please see Table 1.

TABLE 4. Number of penaeid prawn postlarvae collected during day and night on last quarter during 1983 and 1984

Months		PI	PM	PS	P. MER	PJ	MD	MM	Total
January, 1983	..	Collection not taken							
February	..	Collection not taken							
March	D	Nil							
	N	8	1	—	—	1	73	4	87
April		Collection not taken							
May	D	Nil							
	N	3	—	—	—	—	22	2	27
June	D	Nil							
	N	3	1	—	—	—	8	2	14
July	D	2	—	—	—	—	—	—	2
	N	3	—	—	—	—	—	—	3
August	D	Nil							
	N	15	—	—	—	—	3	2	20
September		Collection not taken							
October	D	5	—	—	—	—	1	—	6
	N	1	—	—	—	—	—	—	1
November	D	55	—	2	—	—	—	—	57
	N	6	3	—	—	—	10	—	20
December		Collection not taken							
January, 1984		Collection not taken							
February	D	4	—	—	—	—	1	—	5
	N	3	—	—	—	—	—	—	3
March		Collection not taken							
April	D	Nil							
	N	7	—	—	—	—	13	1	21
May		Collection not taken							
June		Collection not taken							
July	D	20	—	—	—	—	16	—	36
	N	5	—	—	—	—	282	—	287
August	D	Nil							
	N	8	—	—	—	1	35	—	44
September		Collection not taken							
October		Collection not taken							
November	D	10	2	—	—	—	1	—	13
	N	18	3	—	—	—	8	5	34
December		Collection not taken							

NOTE: For abbreviations, please see Table 1.

on four occasions *i.e.* in August, October and November, 1983 and March, 1984 the occurrence of postlarvae was more in the day collections. Maximum number of postlarvae were collected during February, 1983 (158 Night), November, 1983 (123 Day) and May, 1984 (183 Night).

During the first quarter collections were made on 22 occasions. The night collections were richer on all occasions except during October, 1983 when the day collection was more. Maximum number of postlarvae were collected during February (159 Night) and August, 1983 (1337), January (174) June (641), July (384) and August, 1984 (311) all during the night.

During full moon, collections were made on 20 occasions out of which on seven occasions during March, June, November, December, 1983 and January February and October, 1984 the postlarvae were more abundant in day collections. Maximum number of postlarvae were collected at night during the months of February (127), July (138) and August (137) and in October, 1984 maximum (161) was noticed in the day time.

During the last quarter collections were made on 14 occasions in 1983 and on 10 occasions in 1984 of which on three occasions *viz.*, in

October and November, 1983 and in January, 1984 maximum number of postlarvae were seen during the day time. However maximum number of postlarvae was collected in July, 1984 (287) at night.

It is interesting to note that during all the four occasions more number of postlarvae were collected during the day rather than at night during October. During the new moon, first quarter and full moon maximum number of postlarvae were collected during July, 1984 at nights. During the first quarter and full moon in August, 1984 maximum number of postlarvae were collected. Apart from the above peaks during new moon, peaks were observed in November, 1983 and May, 1984 and during January, 1984 in the first quarter and in October, 1984 during the full moon.

The average number of postlarvae per month during four quarters is presented in Table 5. From the Table it is seen that night collections are richer compared to the day collections on all the four quarters. Average number of postlarvae were maximum during the first quarter followed by the last quarter, new moon and full moon. During new moon postlarvae of all the species occurred in higher numbers during night except in case of *Penaeus monodon*.

TABLE 5. Average number of *Penaeid* prawn post larvae during the four quarters

Phase of the moon		PI	PM	PS	P. MER	PJ	MD	MM	Total
New moon	D	10.75	1.15	—	—	—	2.8	0.35	15.05
	N	12.83	0.70	0.90	—	0.25	18.35	1.90	34.93
First Quarter	D	19.00	0.09	0.04	0.09	—	11.27	2.40	32.89
	N	23.90	0.50	0.86	0.09	0.68	126.77	2.86	155.66
Full moon	D	19.15	0.50	—	—	0.05	6.60	0.35	26.65
	N	6.70	0.15	0.30	0.25	0.70	20.05	1.60	29.75
Last Quarter	D	8.00	0.16	0.16	—	—	1.58	—	9.91
	N	6.66	0.66	—	—	0.16	37.83	1.33	46.64

NOTE: For abbreviation, please see Table 1.

During the first quarter more postlarvae were collected during night in all the species. During full moon more numbers were collected during early morning in case of *P. indicus*, and *P. monodon* while in other species like *P. semisulcatus*, *P. merguensis*, *P. japonicus*, *Metapenaeus dobsoni* and *M. monoceros* more numbers occurred during nights only. During the last quarter more number of postlarvae were collected during early morning in case of *P. indicus* and *P. semisulcatus*. In other species like *P. monodon*, *P. japonicus*, *M. dobsoni* and *M. monoceros* night collections were more abundant. There is no difference in the size of the postlarvae collected during day and night.

#### REMARKS

Earlier workers from India collected data only during two quarters viz., the full moon and new moon and concluded that more number of postlarvae occurred during day than night. During the present investigations collections were made during the four phases of the moon viz., new moon, first quarter, full moon and last quarter for the first time. The present data showed that maximum number of postlarvae occurred during the first quarter followed by last quarter, new moon and full moon (Table 5). The present study is therefore significant in that data during the best two quarters

were also gathered which were missing in the earlier accounts. Subrahmanyam and Ganapati (1970) have stated that the larvae in the night collections were invariably plentiful than day collection in the Godavari estuarine system. Subrahmanyam and Rao (1970) have noted that the postlarvae entered the Pulicat lake at nights rather than during day except in one instance when incursion rate of postlarvae of *P. indicus* was 12186/hr in the day collections of full moon of March, 1967 as against 5284/hr at night on the same day. More number of *P. indicus* postlarvae were collected during day on full moon on a number of occasions during the present investigations also.

From the present data it is seen that the postlarvae of *M. dobsoni* prefer to come out during nights to a great extent. The postlarvae of *M. monoceros* shows preference to night to a lesser extent. Postlarvae of *P. indicus* do not seem to be much affected by light. In fact more number of postlarvae were collected on the mornings of full moon and last quarter. During other quarters the collections made during morning and night did not show any marked variations. Because of the small number of postlarvae which could be collected in the case of *P. monodon*, *P. semisulcatus*, *P. merguensis* and *P. japonicus* it is difficult to indicate their preference to darkness or light.

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