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Daily Rhythms of Oxygen Consumption in Freshwater Crab *(Barytelphusa jaquemontii)* & Prawn *(Macrobranchium lamerrii)*

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ABSTRACT- Biological rhythms are the equal combination of ecological & physiological events producing the internal sense of time in living being. The internal metabolic rate is influenced by the degree of voluntary activity that is affected by environmental conditions & is associated with changing season time of day or month and body size Bliss and Montel (1968) found that in general, the smaller individuals within a species or a small sized the species have higher metabolic rate per unit rate and time then larger animals. Dehnel and wines (1960) observed the distinct diurnal rhythm of oxygen consumption the rhythm is characterized that maximum utilization is at 8.00 to 9.00 a.m. by a second smaller peak is at 10.00 to 11.00 p.m. at midnight. Several workers carried out such type of studies Diwan and Nagbhushnam (1972). The crab, *B. jaquemontii* were collected and kept for laboratory acclimatization. The pH & temperature were 7.2 & 15^{0}C respectively. All the crabs were in the size range was 3.0 cm. to 7.0 cm. The experiments were performed of 30 animals and the oxygen consumption of each individual was measured by Wrinkler's Method (1960).

Key words- Oxygen consumption, Aquatic respiration, Respiration, Oxygen

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INTRODUCTION

Numerous water breathers exhibit a gas exchange regulation strategy that maintains 0(2) partial pressure, P (Oxyzen) in the arterial blood within the range 1- 3 kpa at rest during the daytime. In night active crustacean, they examined weather this could limit the rate of 0(2) consumption CM (02) of locomotor muscles and / or the whole body as part of a coordinated response to energy conservation. Carvalho et al (1997) showed the routine metabolic and ammonia excretion rates were measured during minimum but quantities in the shrimp, Xiphopenaeus kroyeri at five different temperatures (20, 22, 25, 28, 30^{0}C) in a flow through system. The animals rapidly achieved uniform rates, showing little han-dling stress, which may represent an experimental artifact that is responsible for wide variation in the measurement of routine rates. A circadian rhythm of R and U rate, was detect as they were significantly higher during dark conditions.

MATERIALS AND METHODS

The crab (*B. jacquemontii*) & prawn (*M. lamerrii*) were collected and kept for laboratory acclimatization. The pH and temperature were 7.2 and 15^{0}C respectively. All the crabs were in the size range was 3.0 cm to 7.0 cm. The experiments were performed 30 animals. The oxygen consumption of individual animals was measured by Wrinkler's method (1960). The crabs were allowed to settle for 24 hrs before recordings were made, and then transferred within 1 hr. to experimental jar. The oxygen consumption measurement was made from morning 9.00 to 10.00 a.m. and measurements were performed 2, 4, 6, 24 and 48 hrs under circadian clock.

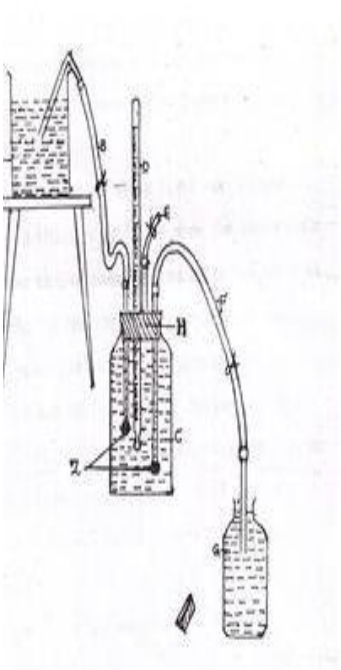

Diagram showing the arrangement of the respiratory chamber

A - Reservoir
B - Inlet tube
C - Respiratory chamber
D - Thermometer
E - Air tight tube
F - Out-let tube
G - Sample collecting bottle
H - Rubber cork

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EXPERIMENTS & RESULTS

Effect of temperature on oxygen consumption of *Crab (Bertelphusa jaquemontii)*

The crab were taken in each weight group i.e. between 0.310 and 0.320 gms and smaller prawns weighting between 0.180 to 0.190 gms, and were exposed to the freshwater pre- adjusted to varying temperatures (thermostatically adjusted). Oxygen consumption was measured at 15^0C, 20^0C, 25^0C, and 30^0C. The room temperature during the course of experiment was 25 ± 1^0C. The results are represented in Table 1A. The Table shows that as the temperature decreased from the control (25 ± 1^0C), the rate of oxygen consumption decrease steadily, but as the temperature increased, the rate of oxygen consumption also increased. Table 1 B indicates the values of $Q_{10.}$ In the bigger prawns Q 10 at high temperature (25 ± 30^0C) was 2.978 and at low temperature (15 ± 25^0C) was 1.809, whereas in the smaller Crabs, Q_{10} at high temperature (25 ± 30^0C) was 1.482 and at low temperature (15 ± 25^0C) was 1.239.

Oxygen consumption of *Berytelphusa jucequemontti* at different sodium chloride concentrations

The prawns are exposed to five different concentrations of Nacl; 0.1%, 0.2%, 0.3%, 0.4% and 0.5%. The first sets of observations were made using from the stock aquarium containing tap water. This served as control. After measuring the oxygen consumption of prawns in normal tap water, experiments were conducted on prawns exposed to above mentioned salt concentrations. The results are given in Table 2. It is evident from the result that oxygen consumption increases steadily from 0.1% to 0.5% of salt concentration.

Influence of pH of the media on oxygen consumption

The oxygen consumption were determined at 9 different pH media, i.e. 5.0, 5.5, 6.5 (Control), 7.0, 7.5, 8.0, 8.5, 9.0 and 9.5 respectively, at the laboratory temperature. The results given in Table 3, demonstrate that in acidic pH the oxygen consumption decreased when compared with the control, at pH 7.0 and 7.5, the respiration did not show much variation. However, high alkaline pH tends to decrease the oxygen uptake.

The influence of oxygen tension of the medium on the oxygen consumption

The oxygen consumption of the prawn was measured at six different oxygen concentrations i.e. 1.6; 2.5, 3.5, 4.6, 5.4, ml/1. The results presented in Table 4 reveals that oxygen consumption did not vary much between oxygen tension of 4.6 to 6.5 ml/1. At low oxygen tension of the medium, the rate of oxygen consumption decreased considerably. With the rise in oxygen tension the rate of oxygen consumption increased.

Effect of decision on oxygen consumption

The oxygen consumption of normal crabs was measured first and this soured as control. 10 prawns were taken from the stock aquaria, blotted thoroughly with filter paper and exposed to the atmospheric air. Every 15 minutes intervals the crabs exposed to the atmospheric air were taken and their oxygen consumption was measured by patting them respirometer. The results are shown in table 5. It is seen from the table that the rate of oxygen consumption was increased as the time of exposure to the atmospheric air increased.

Effect pf starvation on oxygen consumption

The results are shown in Table 6. It is seen that the oxygen consumption was reduced to nearly 50% after starving the Crab for 14 days. The oxygen consumption went on decreasing as the days of starvations increased.

Oxygen consumption in relation to body weight

1. Metabolism varies according to the body weight and sex. This experiment was conducted on Crab of both to sexes separately and the results are shown in Table 7 A and 7 B, table 7 A, shows the results of weight specific oxygen consumption of female prawns and that of table 7 B, shows the results of weight specific oxygen consumption of male prawns. The female prawns weighing between 0.168 to 0.357 gms were grouped at 0.024 gms intervals (average) and their respiratory rates were measured. Likewise, male prawns belonging to the weight groups of 0.075 gms to 0.50 gms were chosen for the experiments. They were grouped t 0.012 gms intervals (average) and their respiratory rates were measured.

The weight specific oxygen consumption for smaller female Crabs (0.168 gms) was found to be 0.51 ± 0.004 ml/ gm/h/1, whereas for the bigger female prawns (0.357 gms), it was 0.015 ± 0.007 ml/gm/1 whereas for the bigger individuals (0.150 gms), the rate of oxygen consumption was found to be 0.045 ± 0.06 ml/gm/h/1.

Thus, the experiments clearly demonstrated that the rate of oxygen consumption was decreased as the body weight increased irrespective of sex of the individuals.

Oxygen consumption in relation to sex

In this experiment male and female Crabs pf almost of same weight groups were taken and their oxygen consumption was measured. The results are given in Table 8. It is quite obvious from the table that the rate of oxygen consumption was found to be more in the male prawns than the females.

Diurnal rhythm in oxygen consumption of *Bertelphusa jaquemontii*

The results are given in Table 9. It is evident from the table that the rate of oxygen consumption was maximum at 8.00 a.m. and minimum at 8.00 p.m. Oxygen consumption went on increasing from 8. P.m. and reached its peak at 8.00 a.m. and then slowly declined by 8.00 p.m. so there appears to be a distinct rhythm in oxygen consumption of *Bertelphusa jaquemontii.*

Effect of photoperiod on oxygen consumption

The data is given in the Table 10. It is seen the table that the oxygen consumption is maximum in the prawns exposed to 24 hrs light. However, the prawns exposed to 18 hrs light and 6 hrs darkness and Vice-Versa showed slight change in the oxygen consumption over the control.

RESULTS

Effect of temperature on oxygen consumption of *M. lamerrli*

The prawns were taken in each weight group i.e. between 0.310 and 0.320 gms and smaller prawns weighting between 0.180 to 0.190 gms, and were exposed to the freshwater pre-adjusted to varying temperatures (thermostatically adjusted). Oxygen consumption was measured at 15^0, 20^0, 25^0 and 30^0C. The room temperature during the course of experiment was 25 $\pm$ 1^0C. The results are represented in Table 1A. The Table shows that as the temperature decreased from the control (25 $\pm$ 1^0C), the rate of oxygen consumption decrease steadily, but as the temperature increased, the rate of oxygen consumption also increased.

Table 1A: Effect of temperature and weight on oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	$25+1^0$C
pH	:	3.6
Oxygen tension	:	6.9 ml/1
Sex	:	Female

Sr. No.	Average weight of prawns (in gms)	Temperature of the dedium in (ºC)	Oxygen consumption Ml/g/h/1 $\pm$ S.D
1	0.315	0.315	0.034 $\pm$ 0.008
2	0.315	0.315	0.046- $\pm$ 0.004
3	0.315	0.315	0.051 $\pm$ 0.009
4	0.315	0.315	0.088 $\pm$ 0.005
5	0.185	0.185	0.073 $\pm$ 0.004
6	0.185	0.185	0.181 $\pm$ 0.002
7	0.185	0.185	0.092 $\pm$ 0.007
8	0.185	0.185	0.011 $\pm$ 0.008

Table 1 B indicates the values of $Q_{10.}$ In the bigger prawns Q_{10} at high temperature (25 $\pm$ 30^0C) was 2.978 and at low temperature (15 $\pm$ 25^0C) was 1.809, whereas in the smaller prawns, Q_{10} at high temperature (25 $\pm$ 30^OC) was 1.482 and at low temperature (15 $\pm$ 25^0C) was 1.239.

Table 1B: ^{Q}10 Oxygen consumption of *Macrobrachium lamerrii* as a function of weight and temperature

S.No.	Weight of the prawn (in grams)	^{Q}10 at		
		15-20^{O}C	20-25^{O}C	25-30^{O}C
1	0.315	1.809	1.229	2.978
2	0.185	1.231	1.290	1.482

Table 1C: Effect of different sodium chloride on oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	25 + 1^0C
pH	:	3.6
Oxygen tension	:	6.9 ml/1
Sex	:	Female

Sr. No.	Average weight of Crabs (in gms)	Temperature of the dedium in (ºC)	Oxygen consumption + S.D. Ml/gm/h/1
1	215.10	15	10.034 $\pm$ 0.034
2	210.20	20	10.046- $\pm$ 0.001
3	210.25	25 (Control)	09.051 $\pm$ 0.034
4	200.30	30	8.088 $\pm$ 08.088
5	175.25	15	7.073 $\pm$ 07.073
6	165.20	20	6.081 $\pm$ 06.081
7	160.15	25 (Control)	5.092 $\pm$ 05.092
8	157.10	30	4.011 $\pm$ 04.011

Table 1D: ^{Q}10 Oxygen consumption of *Berytelphusa jaequemontiii* as a function of weight and temperature

Sr. No.	Weight of the Crab (in grams)	^{Q}10 at		
		15-20^{O}C	20-25^{O}C	25-30^{O}C
1	0.215	1.809	1.229	2.978
2	0.285	1.231	1.290	1.482

Table 1E: A effect of temperature and weight on oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	25 + 1^0C
pH	:	3.6
Oxygen tension	:	6.9 ml/1
Sex	:	Female

Sr. No.	Average weight of Crabs (in gms)	Oxygen consumption + S.D. Ml/g/h/1
1		0.044 $\pm$ 0.006
2	0.1	0.046- $\pm$ 0.004
3	0.2	0.054 $\pm$ 0.005
4	0.3	0.064 $\pm$ 0.007
5	0.4	0.095 $\pm$ 0.008
6	0.5	0.106+ 0.005

Oxygen consumption of *Macrobrachium lamerrii* at different sodium chloride concentrations

The prawns are exposed to five different concentrations of Nacl; 0.1%, 0.2%, 0.3%, 0.4% and 0.5%. The first sets of observations were made using from the stock aquarium containing tap water. This served as control. After measuring the oxygen consumption of prawns in normal tap water, experiments were conducted on prawns exposed to above mentioned salt concentrations. The results are given in Table 2. It is

evident from the result that oxygen consumption increases steadily from 0.1 % to 0.5 % of salt concentration.

Table 2A: Effect of different sodium chloride consumptions on the oxygen consumption of *Macrobrachium lamerrii*

Temperature	:	26 + 1^{0}C
Oxygen tension	:	4.6 ml/1
pH	:	6.8
Average weight	:	0.268 gms
Sex	:	Female

Sr. No.	Salinity (X)	Oxygen consumption + S.D. Ml/gm/h/1
1	Control	0.044 ± 0.006
2	0.1	0.046 ± 0.004
3	0.2	0.054 ± 0.005
4	0.3	0.064 ± 0.007
5	0.4	0.095 ± 0.008
6	0.5	0.106 ± 0.005

Table 2B: Effect of different sodium chloride consumptions on the oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	26 + 1^{0}C
Oxygen tension	:	4.6 ml/1
pH	:	6.8
Average weight	:	0.168 gms
Sex	:	Female

Sr. No.	Salinity (X)	Oxygen consumption + S.D. Ml/gm/h/1
1	Control	10.044 ± 0.006
2	0.1	10.046 ± 0.004
3	0.2	10.054 ± 0.005
4	0.3	10.064 ± 0.007
5	0.4	10.095 ± 0.008
6	0.5	10.106 ± 0.005

Influence of pH of the media on oxygen consumption

The oxygen consumption was determined at 9 different pH media, i.e. 5.0, 5.5, 6.5 (Control), 7.0, 7.5, 8.0, 8.5, 9.0 and 9.5 respectively at the laboratory temperature. The results given in Table 3, demonstrate that in acidic pH the oxygen consumption decreased when compared with the control, at pH 7.0 and 7.5, the respiration did not show much variation. However, high alkaline pH tends to decrease the oxygen uptake.

Table 3 A: Effect of the different pH of the media on oxygen consumption of *Macrobrachium lamerrii*

Temperature	:	27 + 1^{0}C
pH of H_2O	:	6.5
Oxygen tension	:	6.69 ml/1
Weight	:	0.265 gms
Sex	:	Female

Sr. No.	Salinity (x)	Oxygen consumption + S.D. Ml/gm/h/1
1	6.4 Control	0.024 ± 0.007
2	5.0	0.017 ± 0.006
3	5.5	0.019 ± 0.005
4	7.0	0.024 ± 0.006
5	7.5	0.023 ± 0.008
6	8.0	0.021 ± 0.004
7	8.5	0.018 ± 0.006
8	9.0	0.015 ± 0.007
9	9.5	0.12 ± 0.008

Table 3B: Effect of the different pH of the media on oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	27 + 1^{0}C
pH of H_2O	:	6.5
Oxygen tension	:	6.69 ml/1
Weight	:	265 gms
Sex	:	Female

S. No.	Salinity (x)	Oxygen consumption + S.D. Ml/gm/h/1
1	6.4 Control	10.024 ± 0.007
2	5.0	10.017 ± 0.006
3	5.5	10.019 ± 0.005
4	7.0	10.024 ± 0.006
5	7.5	10.023 ± 0.008
6	8.0	10.021 ± 0.004
7	8.5	10.018 ± 0.006
8	9.0	10.015 ± 0.007
9	9.5	10.012 ± 0.008

The influence of oxygen tension of the medium on the oxygen consumption

The oxygen consumption of the prawn was measured at six different oxygen concentrations i.e. 1.6, 2.5, 3.5, 4.6, 5.4, ml/1. The results presented in Table 4 reveals that oxygen consumption did not vary much between oxygen tension of 4.6 to 6.5 ml/1. At low oxygen tension of the medium, the rate of oxygen consumption decreased considerably. With the rise in oxygen tension the rate of oxygen consumption increased.

Table 4 A: Effect of the oxygen tension of the medium on the oxygen consumption of *Macrobrachium lamerrii*

Temperature	:	26 + 1^{0}C
pH of H_2O	:	6.8
Oxygen tension	:	4.6 ml/1
Average Weight	:	0.270 gms
Sex	:	Female

Sr. No.	Salinity (X)	Oxygen consumption + S.D. Ml/gm/h/1
1	1.6	0.006 ± 0.007
2	2.5	0.022 ± 0.006
3	3.5	0.042 ± 0.008
4	4.6 Control	0.069 ± 0.005
5	5.4	0.071 ± 0.005
6	6.5	0.073 ± 0.007
7	7.0	0.077 ± 0.006

Table 4B: Effect of the oxygen tension of the medium on the oxygen consumption of *Berytelphusa jaequemontiii*

Temperature : 26 + 1^0C
pH of H_2O : 6.8
Oxygen tension : 4.6 ml/1
Average Weight : 270 gms
Sex : Female

Sr. No.	Salinity (X)	Oxygen consumption + S.D. Ml/gm/h/1
1	1.6	11.006 ± 0.007
2	2.5	10.022 ± 0.006
3	3.5	11.042 ± 0.008
4	4.6 Control	09.069 ± 0.005
5	5.4	10.071 ± 0.005
6	6.5	08.073 ± 0.007
7	7.0	07.077 ± 0.006

Effect of decision on oxygen consumption

The oxygen consumption of normal crabs was measured first and this soured as control. 10 prawns were taken from the stock aquaria, blotted thoroughly with filter paper and exposed to the atmospheric air. Every 15 minutes intervals the crabs exposed to the atmospheric air were taken and their oxygen consumption was measured by patting them respirometer. The results are sown in table 5. It is seen from the table that the rate of oxygen consumption was increased as the time of exposure to the atmospheric air increased.

Table 5A: Effect of desiccation on the oxygen of *Macrobrachium lamerrii*

Temperature : 26 + 1^0C
Average Weight : 0.268 gms
Sex : Female

Sr. No.	Salinity (X)	Oxygen consumption + S.D. Ml/gm/h/1
1	Control	0.056 ± 0.005
2	15	0.061 ± 0.007
3	30	0.070 ± 0.008
4	45	0.079 ± 0.006
5	60	0.088 ± 0.007
6	75	0.096 ± 0.005
7	90	0.108 ± 0.008
8	105	0.177 ± 0.006
9	120	0.123 ± 0.006

Table 5B: Effect of desiccation on the oxygen of *Berytelphusa jaequemontiii*

Temperature : 26 + 1^0C
Average Weight : 268 gms
Sex : Female

Sr. No.	Salinity (X)	Oxygen consumption + S.D. Ml/gm/h/1
1	Control	10.056 ± 0.005
2	15	10.061 ± 0.007
3	30	10.070 ± 0.008
4	45	10.079 ± 0.006
5	60	10.088 ± 0.007
6	75	09.096 ± 0.005
7	90	08.108 ± 0.008
8	105	07.177 ± 0.006
9	120	06.123 ± 0.006

Effect of starvation on oxygen consumption

The results are shown in Table 6. It is seen that the oxygen consumption was reduced to nearly 50% after starving the Crab for 14 days. The oxygen consumption went on decreasing as the days of starvations increased.

Table 6A: Effect of the starvation on the oxygen consumption of *Macrobrachium lamerrii*

Temperature : 26 + 1^0C
pH of H_2O : 6.7
Oxygen tension : 5.04 ml/1
Average Weight : 0.267 gms
Sex : Female

Sr. No.	Days of starvation	Oxygen consumption + S.D. Ml/gm/h/1
1	Control	0.056 ± 0.005
2	2	0.051 ± 0.004
3	4	0.045 ± 0.006
4	6	0.040 ± 0.007
5	8	0.037 ± 0.008
6	10	0.033 ± 0.005
7	12	0.030 ± 0.007
8	14	0.028 ± 0.006
9	16	0.016 ± 0.008
10	18	0.010 ± 0.004

Table 6B: Effect of the starvation on the oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	26 + 1^{0}C
pH of H_2O	:	6.7
Oxygen tension	:	5.04 ml/1
Average Weight	:	267 gms
Sex	:	Female

Sr. No.	Days of starvation	Oxygen consumption + S.D. Ml/gm/h/1
1	Control	10.056 ± 0.005
2	2	10.051 ± 0.004
3	4	10.045 ± 0.006
4	6	10.040 ± 0.007
5	8	10.037 ± 0.008
6	10	10.033 ± 0.005
7	12	09.030 ± 0.007
8	14	07.028 ± 0.006
9	16	05.016 ± 0.008
10	18	04.10 ± 0.004

Oxygen consumption in relation to body weight

Metabolism varies according to the body weight and sex. This experiment was conducted on Crab of both to sexes separately and the results are shown in Table 7 A and 7 B, table 7 A, shows the results of weight specific oxygen consumption of female prawns and that of table 7 B, shows the results of weight specific oxygen consumption of male prawns. The female prawns weighing between 0.168 to 0.357 gms were grouped at 0.024 gms intervals (average) and their respiratory rated were measured. Likewise, male prawns belonging to the weight groups of 0.075 gms to 0.50 gms were chosen for the experiments. They were grouped t 0.012 gms intervals (average) and their respiratory rates were measured.

The weight specific oxygen consumption for smaller female Crabs (0.168 gms) was found to be 0.51±0.004 ml/ gm/h/1, whereas for the bigger female prawns (0.357 gms), it was 0.015±0.007 ml/ gm/h/1.

In the caser of male prawns, the weight specific oxygen consumption for smaller individuals (0.075 gms) was found to be 0.092 ± 0.007 ml/ gm/1 whereas for the bigger individuals (0.150 gms), the rate of oxygen consumption was found to be 0.045±0.06 ml/gm/h/1.

Thus, the experiments clearly demonstrated that the rate of oxygen consumption was decreased as the body weight increased irrespective of sex of the individuals.

Table 7A: Effect of the different body weights and sex on the oxygen consumption of *Macrobrachium lamerrii*

Temperature	:	26 + 1^{0}C
pH of H_2O	:	6.8
Oxygen tension	:	5.02 ml/1
Average Weight	:	0.267 gms
Sex	:	Female

Sr. No.	Average body weight of a prawn (In grams)	Oxygen consumption + S.D. Ml/gm/h/1
1	0.168	0.051 ± 0.004
2	0.180	0.047 ± 0.006
3	0.201	0.045 ± 0.007
4	0.228	0.042 ± 0.006
5	0.248	0.036 ± 0.005
6	0.267	0.033 ± 0.008
7	0.282	0.026 ± 0.008
8	0.321	0.020 ± 0.006
9	0.357	0.015 ± 0.007

Table 7B: Effect of the different body weights and sex on the oxygen consumption-Prawn

Temperature	:	27 + 1^{0}C
pH of H_2O	:	6.7
Oxygen tension	:	5.26 ml/1
Average Weight	:	0.267 gms
Sex	:	Male

Sr. No.	Average body weight (In grams)	Oxygen consumption ± S.D. Ml/gm/h/1
1	0.075	0.092 ± 0.007
2	0.084	0.088 ± 0.008
3	0.098	0.073 ± 0.005
4	0.011	0.065 ± 0.008
5	0.125	0.058 ± 0.007
6	0.137	0.050 ± 0.005
7	0.150	0.045 ± 0.006

Table 7C: Effect of the different body weights and sex on the oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	26 + 1^{0}C
pH of H_2O	:	6.8
Oxygen tension	:	5.02 ml/1
Average Weight	:	267 gms
Sex	:	Female

Sr. No.	Average body weight of a Crab (In grams)	Oxygen consumption + S.D. Ml/gm/h/1
1	168	10.051 ± 0.004
2	180	10.047 ± 0.006
3	201	10.045 ± 0.007
4	228	10.042 ± 0.006
5	248	10.036 ± 0.005
6	267	10.033 ± 0.008
7	282	09.026 ± 0.008
8	321	06.020 ± 0.006
9	357	04.015 ± 0.007

Table 7D: Effect of the different body weights and sex on the oxygen consumption *Berytelphusa jaequemontiii*

Temperature	:	27 + 1^{0}C
pH of H_2O	:	6.7
Oxygen tension	:	5.26 ml/1
Average Weight	:	267 gms
Sex	:	Male

Sr. No.	Average body weight (In grams)	Oxygen consumption ± S.D. Ml/gm/h/1
1	75	10.092 ± 0.007
2	84	10.088 ± 0.008
3	98	10.073 ± 0.005
4	11	10.065 ± 0.008
5	25	06.058 ± 0.007
6	137	05.050 ± 0.005
7	150	04.45 ± 0.006

Oxygen consumption in relation to sex

In this experiment male and female Crabs of almost of same weight groups were taken and their oxygen consumption was measured. The results are given in Table 8. It is quite obvious from the table that the rate of oxygen consumption was found to be more in the male prawns than the females.

Table 8A: Effect of sex on the oxygen consumption of *B. jaequemontii*

Temperature	:	27 + 1^{0}C
pH of H_2O	:	6.7
Oxygen tension	:	5.26 ml/1
Average Weight	:	0.267 gms
Sex	:	Male

Sr. No.	Sex	Average body weight (In grams)	Oxygen consumption ± S.D. Ml/gm/h/1
1	Male	0.166	0.062 ± 0.005
	Female	0.168	0.051 ± 0.008
2	Male	0.198	0.052 ± 0.006
	Female	0.200	0.074 ± 0.007
3	Male	0.226	0.049 ± 0.007
	Female	0.228	0.072 ± 0.005
4	Male	0.247	0.040 ± 0.006
	Female	0.248	0.036 ± 0.008
5	Male	0.262	0.037 ± 0.005
	Female	0.264	0.033 ± 0.008

Table 8B: Effect of sex on the oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	27 + 1^{0}C
pH of H_2O	:	6.7
Oxygen tension	:	5.26 ml/1
Average Weight	:	267 gms
Sex	:	Male

Sr. No.	Sex	Average body weight (In grams)	Oxygen consumption ± S.D. Ml/gm/h/1
1	Male	166	10.062 ± 0.005
	Female	168	10.051 ± 0.008
2	Male	198	10.052 ± 0.006
	Female	200	09.074 ± 0.007
3	Male	226	08.049 ± 0.007
	Female	228	08.072 ± 0.005
4	Male	247	07.040 ± 0.006
	Female	248	07.036 ± 0.008
5	Male	262	06.037 ± 0.005
	Female	264	06.33 ± 0.008

Diurnal rhythm in oxygen consumption of *Bertelphusa jaquemontii*

The results are given in Table 9. It is evident from the table that the rate of oxygen consumption was maximum at 8.00 a.m. and minimum at 8.00 p.m. Oxygen consumption went on increasing from 8. p.m and reached its peak at 8.00 a.m. and then slowly declined by 8.00 p.m. so there appears to be a distinct rhythm in oxygen consumption of *Bertelphusa jaquemontii.*

Table 9A: Diurnal rhythm in oxygen consumption of *Macrobrachium lamerrii*

Oxygen tension	:	4.76 to 5.6 ml/1
pH of H_2O	:	6.9
Average Weight	:	0.268 gms
Sex	:	Male

Sr. No.	Average body weight (In grams)	Oxygen consumption ± S.D. Ml/gm/h/1
1	8 a.m.	0.028 ± 0.004
2	12 noon	0.022 ± 0.006
3	4 p.m.	0.021 ± 0.005
4	8 p.m.	0.011 ± 0.006
5	12 mid night	0.015 ± 0.007
6	4 a.m.	0.028 ± 0.007

Table 9B: Diurnal rhythm in oxygen consumption of *Berytelphusa jaequemontiii*

Oxygen tension	:	4.76 to 5.6 ml/1
pH of H_2O	:	6.9
Average Weight	:	268 gms
Sex	:	Male

Sr. No.	Average body weight (In grams)	Oxygen consumption ± S.D. Ml/gm/h/1
1	8 a.m.	10.028 ± 0.004
2	12 noon	12.022 ± 0.006
3	4 p.m.	10.021 ± 0.005
4	8 p.m.	10.011 ± 0.006
5	12 mid night	09.015 ± 0.007
6	4 a.m.	07.28 ± 0.007

Effect of photoperiod on oxygen consumption

The data is given in the Table 10. It is seen from the table that the oxygen consumption is maximum in the prawns exposed to 24 hrs light. However, the prawns exposed to 18 hrs light and 6 hrs darkness and Vice-Versa showed slight change in the oxygen consumption over the control.

Table 10A: Effect of photoperiod on the oxygen consumption of *Macrobrachium lamerrii*

Temperature	:	$27 + 1^0C$
pH of H_2O	:	6.9
Oxygen tension	:	4.92 ml/1
Average Weight	:	0.270 gms
Sex	:	female

Sr. No.	Average body weight (In grams)	Oxygen consumption ± S.D. Ml/gm/h/1
1	12 D : 12 L (Control)	0.053 ± 0.004
2	24 D : O L	0.055 ± 0.005
3	12 D : 12 L	0.057 ± 0.008
4	6 D : 18 L	0.052 ± 0.007
5	18 D : 6 L	0.054 ± 0.006

Table 10B: Effect of photoperiod on the oxygen consumption of *Berytelphusa jaequemontiii*

Temperature	:	$27 + 1^0C$
pH of H_2O	:	6.9
Oxygen tension	:	4.92 ml/1
Average Weight	:	270 gms
Sex	:	female

Sr. No.	Average body weight (In grams)	Oxygen consumption ± S.D. Ml/gm/h/1
1	12 D : 12 L (Control)	10.053 ± 0.004
2	24 D : O L	10.055 ± 0.005
3	12 D : 12 L	10.057 ± 0.008
4	6 D : 18 L	10.052 ± 0.007
5	18 D : 6 L	10.054 ± 0.006

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