

## NOTES

### EFFECT OF SOME ENVIRONMENTAL PARAMETERS ON RESPIRATORY METABOLISM OF *GELASIMUS* SPP. OF MITHBAV CREEK

#### ABSTRACT

The present study throws light on the rate of oxygen consumption of *Gelasimus* spp., in relation to environmental parameters such as salinity, temperature and pH. The rate of oxygen consumption increases along with increase in salinity upto 25–26‰ and decreases thereafter. It increases along with the temperature upto 30°C and then decline upto 41°C. The rate is also affected by hydrogen ion concentration in between 5.5 to 8.9.

SEVERAL hydrological factors are known to affect on the respiration of *Gelasimus* spp. directly or indirectly. The rate of oxygen consumption under various environmental conditions, is well documented by many investigators, in marine and estuarine conditions. The present investigation was under taken to study the effects of salinity, temperature and pH, on the rate of oxygen uptake in *Gelasimus* spp.

#### Material and methods

*Gelasimus* spp. were collected from the Mithbav Creek, brought to the laboratory and acclimatised for 4 to 5 days to the laboratory conditions. The oxygen content of the water samples was determined by the standard Winkler's method. The results of each experiment are based on five determinations and expressed as oxygen uptake in ml/gm/hr.

#### Results

**Effect of low salinity:** The batches of *Gelasimus* were subjected to different salinities 9.7, 12.6, 20.4, 25.6, 30.1, 32.4. The normal sea water and pH (7.6) was constant, the oxygen consumption in each salinity was determined. The results are presented in Table 1.

**Effect of pH:** The rate of oxygen uptake was determined at 5 different pH. To obtain

TABLE 1. Oxygen consumption (ml O<sub>2</sub>/gm/hr) of *Gelasimus* spp. at different salinities (‰)

Salinity	<i>G. annulipes</i>	<i>G. marionis</i>	<i>G. dussumieri</i>
9.7	0.612	0.722	0.625
12.6	0.602	0.711	0.651
20.4	0.741	0.821	0.712
25.6	0.629	0.841	0.685
30.1	0.618	0.715	0.632
32.4	0.523	0.683	0.610

the required pH of the medium dilute HCl or NaOH was added to normal sea water (7.6). The result in Table 2 show that the rate of oxygen uptake was high in low pH and decreased in high pH. The rate of oxygen consumption was 0.705, 0.624 and 0.713 at pH 7.6 for *Gelasimus annulipes*, *G. marionis* and *G. dussumieri* respectively, but below this decreased gradually.

TABLE 2. Oxygen consumption (ml O<sub>2</sub>/gm/hr) in relation to pH

pH	<i>G. annulipes</i>	<i>G. marionis</i>	<i>G. dussumieri</i>
5.5	0.631	0.754	0.615
6.2	0.612	0.719	0.637
7.6	0.705	0.624	0.713
8.2	0.515	0.602	0.538
8.9	0.421	0.511	0.511

**Effect of Temperature:** Batches of *Gelasimus* were exposed to 6 different temperatures. The respective temperature of the experimental media was thermostatically adjusted and kept constant. The salinity and pH were also kept constant (32.6‰ and 7.6 pH). The results are presented in Table 3 show that the oxygen uptake increased with increase in temperature upto 32.1° C and then decreased sharply at 41° C

TABLE 3. Oxygen consumption (ml O<sub>2</sub>/gm/hr) in relation to temperature (°C)

Temperature	<i>G. annulipes</i>	<i>G. marionis</i>	<i>G. dussumieri</i>
20.2	0.421	0.525	0.445
25.4	0.433	0.545	0.483
30.7	0.501	0.632	0.517
32.1	0.619	0.716	0.618
35.0	0.409	0.511	0.424
41.0	0.327	0.408	0.327

#### Discussion

Changes in salinity, temperature and pH are known to affect the rate of oxygen consumption in an aquatic animals. In many euryhaline invertebrates the rate of oxygen consumption varies inversely to the changes in the salinity of the external medium. Schwade (1933) showed that the rate of oxygen consumption of *Carcinus maenas* increased in hypotonic media. It was noted that the decrease in

salinity of the external medium caused increase in metabolism of animals (William, 1953). In the present study the oxygen uptake of *Gelasimus* spp. increased upto 20.4‰ in *G. annulipes* and *G. dussumieri* while in *G. marionis* upto 25.6‰ beyond this salinity of oxygen uptake decreased.

Hoff (1928) showed that the rate of oxygen uptake in *Cambarus* was not dependent on the changes in pH of the external medium. Gopalakrishnan (1957) also found that in *Metapenaeus monoceros*, the oxygen consumption was not directly affected by the changes in pH. Power (1930) found that fishes are affected directly by increase or decrease in the pH of the medium. Nagabhushanam (1966) observed the maximum rate of oxygen uptake in pH 7.6 and the minimum in pH 8.2 in *P. laterisulca*. In the present investigation the oxygen uptake increased gradually upto pH 7.6.

The rate of metabolic activity is mostly seems to increase with increase in temperature upto certain level. In *Martesia striata* a little in oxygen uptake with the rise in temperature from 24.0 to 33.0° C was recorded by Nagabhushanam (1966). In *Gelasimus* spp. increase in oxygen uptake was observed with the rise in temperature from 20.1° to 32.1° C and then sharply decreased as the temperature reached 41° C.

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