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CHANGES OF PHYSIOLOGICAL STATUS IN ANTARCTIC KRILL *EUPHAUSIA SUPERBA* IN RESPONSE TO LIGHT REGIME SIMULATION

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The effect of different light regimes on physiological parameters of Antarctic krill, *Euphausia superba,* (feeding activity, oxygen consumption, activity of the metabolic enzyme malate dehydrogenase (MDH)) was studied over 12 weeks under laboratory conditions. Freshly caught krill were reared for two months under natural Antarctic photoperiod in the laboratory. Thereafter, subsamples of krill were taken and exposed to one of the following light regimes to simulate Southern Ocean summer, autumn and winter conditions, respectively: a) continuous light (LL; 200 lx), b) 12 hours light and 12 hours darkness (LD 12:12; 50 lx) and c) continuous darkness (DD). In all experimental groups the food concentration was kept at high levels (~ 800 µg C l^{-1}). Changes in physiological parameters (see above) were recorded weekly. Krill exposed to LL and LD 12:12 showed an increase in clearance rate, daily C ration and digestive gland size over the experimental period. A similar trend was observed in oxygen consumption rate and MDH activity. Physiological parameters of krill held under LD 12:12 showed a more consistent increase and remained below those of krill held under LL. No evident change of parameters was recorded for krill exposed to DD. Clearance rates and daily C rations of krill held under continuous darkness did not respond to the high food availability. Concomitantly, no changes of the digestive gland size were recorded. The metabolic rate measurements showed a similar response to the different light regimes. Oxygen consumption rates and MDH activity of krill exposed to winter light condition were significantly ($p < 0.05$) lower than those of krill exposed to summer light condition. The results demonstrate that changes in the environmental light regime have an important effect on physiological parameters of krill such as feeding and metabolic rates. Detection of immunoreactive melatonin in eyestalks and hemolymph of krill may suggest that changes in the photoperiod are transmitted via differences in melatonin secretion in krill which in turn may influence its physiology.