Daily periods of hypoxia affect the physiology of the shrimp *Palaemon varians*, impacting growth, body size and reproductive output.

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The quantity of oxygen in aquatic habitats is not always constant. Salt marshes and other coastal habitats are often saturated with oxygen (i.e. normoxic conditions) during the day and suffer extremely low oxygen (i.e. hypoxic conditions) during the night. This succession of normoxic and hypoxic periods is known as daily cyclic hypoxia. Despite being a natural phenomenon, cyclic hypoxia is a stressful condition that is able to alter physiological processes (e.g. growth or reproduction) and negatively impact the biology of many species. In order to better understand the consequences of cyclic hypoxia, we exposed the ditch shrimp *Palaemon varians*, a species commonly found in salt marshes of northern Europe, to cyclic hypoxia in the laboratory for up to 40 days and we assessed changes in its physiology in comparison to control shrimps kept in normoxia.

Cyclic hypoxia affected the shrimp's moult cycle (the regular shedding of an old exoskeleton and the production of a new one to permit growth). The moult cycle of shrimp exposed to cyclic hypoxia was 15% shorter in comparison to control animals. Interestingly, shrimps subjected to cyclic hypoxia increased the surface area of their gills during the moulting process, which could allow them to obtain oxygen in a more efficient way during hypoxia.

Shrimp held in cyclic hypoxia reduced the amount of food that they ate and the amount of waste that they expelled;

after one month in cyclic hypoxia animals had a ~4% lower body weight. This reduction could have important consequences, since smaller sized animals may be more vulnerable to predators and competitors. In addition, we found that the eggs produced by females kept in cyclic hypoxia had a ~24% lower content of yolk, suggesting that offspring hatching from these eggs may have lower energy reserves to complete their development to adult stages.

In conclusion, we have shown how cyclic hypoxia negatively impacts the biology of the shrimp *Palaemon varians*, a species that plays an important ecological role in salt marshes of northern Europe.