What time is it? Circadian clocks in crustaceans

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Abstract

Habitats of almost all organisms are exposed to daily light-darkness cycles. Organisms adapted to these daily fluctuations evolved an internal pacemaker: the circadian ("*circa diem"*: approximately a day) clock. The circadian clock allows organisms to synchronize their behavior and physiology with the daily environmental cues and, most importantly, anticipate them. Crustaceans inhabit all marine and freshwater environments of the earth and also live in terrestrial or semi-terrestrial habitats. In the recent years several crustacean species (e.g., *Eurydice pulchra*) have gained attention from researchers tackling questions that are impossible to answer using classic model organisms (e.g., *Drosophila melanogaster*). I will present the advances made in understanding the mechanisms governing circadian rhythms in crustaceans by using the Norway lobster (*Nephrops norvegicus*) as model organism. *Nephrops* is a burrowing species inhabiting the muddy deep-sea bottoms of the Mediterranean and European Atlantic Ocean where it is exposed to both light-darkness and tidal current cycles. Our recent data indicate that tidal currents play an important role in modulating daily burrowing behavior of *Nephrops* providing new scenarios for understanding biological rhythm in deep-sea aphotic areas worldwide. At the same time, I will provide new insights on the molecular circadian clockwork of this species by using transcriptomics and RT-qPCR approaches on cDNA extracted from the eyestalk and brain. Our results suggest the eyestalk as the location of the main circadian pacemaker in Decapods. Finally, *Nephrops* (as many others animals) display aggressive behavior and dominance hierarchies emerge in groups of individuals. I will show how dominance ranks affect daily burrow emergence behavior and how circadian clock synchronization is important in the maintenance of stable dominance hierarchies.