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TITLE: Artificial light at night alters trophic interactions of intertidal invertebrates

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ABSTRACT:

Despite being globally widespread in coastal regions, the impacts of light pollution on intertidal ecosystems has received little attention. Intertidal species exhibit many night-time-dependent ecological strategies, including feeding, reproduction, orientation and predator avoidance, which are likely negatively affected by shifting light regimes, as has been observed in terrestrial and aquatic taxa. Coastal lighting may shape intertidal communities through its influence on the nocturnal foraging activity of dogwhelks (*Nucella lapillus*), a widespread predatory mollusc that structures biodiversity in temperate rocky shores. In the laboratory, we investigated whether the basal and foraging activity of this predator was affected by exposure to night-time lighting both in the presence and absence of olfactory predator cues (*Carcinus maenas*, common shore crab). Assessments of dogwhelks' behavioural responses to night-time white LED lighting were performed on individuals that had been acclimated to night-time white LED lighting conditions for 16 days and individuals that had not previously been exposed to artificial light at night. Dogwhelks acclimated to night-time lighting exhibited natural refuge-seeking behaviour less often compared to control animals, but were more likely to respond to and handle prey irrespective of whether olfactory predator cues were present. These responses suggest night-time lighting likely increased the energetic demand of dogwhelks through stress, encouraging foraging whenever food was available, regardless of potential danger. Contrastingly, whelks not acclimated under night-time lighting were more likely to respond to the presence of prey under artificial light at night when olfactory predator cues were present, indicating an opportunistic shift towards the use of visual instead of olfactory cues in risk evaluation. These results demonstrate that artificial night-time lighting influences the behaviour of intertidal fauna such that the balance of interspecific interactions involved in community structuring may be affected.

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