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Mitigating thermal effect of behaviour and microhabitat on the intertidal snail *Littorina saxatilis* (Olivi) over summer

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Abstract.

High shore intertidal ectotherms must withstand temperatures which are already close, at or beyond their upper physiological thermal tolerance. Their behaviour can provide a relief under heat stress, and increase their survival through thermoregulation. Here, we used infrared imaging to reveal the thermoregulatory behavioural strategies used by the snail *Littorina saxatilis* (Olivi) on different microhabitats of a high shore boulder field in Finistère (western France) in summer. On our study site, substrate temperature is frequently greater than *L. saxatilis* upper physiological thermal limits, especially on sun exposed microhabitats. To maintain body temperatures within their thermal tolerance window, withdrawn snails adopted a flat posture, or elevated their shells and kept appended to the rock on the outer lip of their aperture with dried mucous (standing posture). These thermal regulatory behaviours lowered snail body temperatures on average by 1°C to 2°C. Aggregation behaviour had no thermoregulatory effect on *L. saxatilis* in the present study. The occupation of biogenic microhabitats (barnacles) was associated with a 1°C decrease in body temperatures. Barnacles and microhabitats that experienced low sun exposure, low thermal fluctuations and low thermal maxima, could buffer the heat extremes encountered at high shore level especially on sun exposed microhabitats.

Key words. heat stress, rocky shore, ectotherms, gastropod, infrared thermography