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Possible environmental & biological controls on carapace size in *Cyprideis torosa* (Jones, 1850)

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Cyprideis torosa has been the focus of many ecological and biological studies. A number of factors make this species of particular interest, in particular its wide biogeographic range today, a relatively long stratigraphical range and its ability to inhabit waters of varying salinity (or solute composition) as well as a significant total salinity range with reports of occurrences in waters from freshwater to those in excess of 150‰. Where it does occur, it often does so in extremely high abundances making it useful for a range of analytical and morphological/morphometric studies. These approaches have made *C. torosa* fundamentally important in reconstructing past changes in water chemistry, particularly salinity as a key to understanding past climatic change.

A number of authors have commented on the occurrence and significance of noding on the lateral surfaces (Kilenyi 1972) as an indicator of relatively low salinity conditions (generally less than about 3‰) and the environmental controls and biological processes behind their formation have also been discussed (Keyser 2005) in relation to the osmoregulatory capabilities of this species, a key function for an organism inhabiting waters of variable salinity. The shape of sieve-pores on the lateral carapace surfaces of *C. torosa* have also been identified as indicative of particular salinity levels (Rosenfeld & Vesper 1977). Van Harten (1975) introduced the possibility that there may be a negative relationship between *C. torosa* carapace size and the salinity of the waters in which it lives, since that first publication, little further work has been undertaken on this subject.

In this paper we re-visit Van Harten's morphometrical approach using a dataset from 7 locations across Europe into central Asia, all sites have relatively stable salinity, but range from about 1–40‰. Our results suggest a 2-stage size-response to salinity, those inhabiting salinities of less than about 8–9‰ were larger with relatively little change relative to salinity. However, above this level there appears to be a significant reduction to smaller valve sizes, the rate of shell-size decrease becomes less as salinity increases possibly reflecting an exponential decay. This "tipping point" or threshold at about 8–9‰ sits at exactly the environmental/physiological boundary between hypo- and hyper-osmoregulation in *C. torosa* (Aladin 1993) and points strongly to a further physiological response related to salinity. The possible palaeoenvironmental implications are discussed together with an indication of some of the caveats involved in such work and suggestions for further research directions.

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