

Further twists in gastropod shell evolution

Abstract

The manner in which a gastropod shell coils has long intrigued laypersons and scientists alike. In evolutionary biology, gastropod shells are among the best-studied palaeontological and neontological objects. A gastropod shell generally exhibits logarithmic spiral growth, right-handedness and coils tightly around a single axis. Atypical shell-coiling patterns (e.g. sinistroid growth, uncoiled whorls and multiple coiling axes), however, continue to be uncovered in nature. Here, we report another coiling strategy that is not only puzzling from an evolutionary perspective, but also hitherto unknown among shelled gastropods. The terrestrial gastropod *Opisthostoma vermiculum* sp. nov. generates a shell with: (i) four discernable coiling axes, (ii) body whorls that thrice detach and twice reattach to preceding whorls without any reference support, and (iii) detached whorls that coil around three secondary axes in addition to their primary teleoconch axis. As the coiling strategies of individuals were found to be generally consistent throughout, this species appears to possess an unorthodox but rigorously defined set of developmental instructions. Although the evolutionary origins of *O. vermiculum* and its shell's functional significance can be elucidated only once fossil intermediates and live individuals are found, its bewildering morphology suggests that we still lack an understanding of relationships between form and function in certain taxonomic groups.

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