Theoretical morphology of logistic coiling exemplified by tests of genus *Alveolina* (larger foraminifera)

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With 4 figures in the text


Abstract: The logistic growth model for simulating spiral equatorial sections of larger foraminifera (DE RENZI 1988) is expanded. The point coordinates of an initial generating curve are transformed according to two different logistic laws, resulting in two differential whorl expansion rates. Empirical studies of axial sections of species of the genus *Alveolina* show a good fit of the model.


Introduction

Theoretical morphology is an important tool in morphodynamics (SEILACHER 1991). It analyses the geometrical parameters into which the underlying morphogenetic processes generating a structure become translated and thus allows the building of morphospaces as conceptual frameworks for understanding morphology and its evolutionary constraints (e.g. McGHEE 1980). Theoretical morphology differs from biometrics or biostatistics as it searches for the essential geometric growth rules in any particular case; moreover, allometries can be only understood by means of a theoretical morphological analysis.

A first important model, developed by RAUP (1966) (see also RAUP & MICHELSON 1965), assumed isometric growth for coiled shells. It was derived from the approximate logarithmic spirals outlined by particular