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"Moving sclerochronology to shell growth morphodynamics: A comprehensive approach"

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Sclerochronology is presented as an approach to reconstruct, from linear growth records, environmental conditions. This was proposed by analogy with dendrochronology, but shells differ from trees since shells increase in size by terminal, instead of radial, growth. However, variability in the accretion process is being disregarded since it is minimized by the calculations of the "average individual", a non-existent concept in theoretical ecology because this theoretical individual would possess all characteristics averaged at the same time. Furthermore, growth models are assumed to be static representations of dynamic processes, hypothesized to change under the influence of local disturbances.

We have revised this, describing growth by incrementation in a morphodynamic model of the shell, permitting exploration of growth variability. We replaced the "average individual" by a concept of "time-varying covariance", establishing similarities within groups of individuals submitted to the same environmental conditions, even with high variability in their growth patterns. We believe that these approaches to growth and form linking mathematics, biology and ecology have potential to make profound changes across many disciplines, including oncology, by emphasizing the multidimensionality of growth processes, supplanting the current correlations with environmental variables by global analyses of biological and morphological dynamic patterns.