

## Fractal analysis of ostracod shell variability: A comparison with geometric and classic morphometrics

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Two statistical methods, fractal geometry and geometric morphometrics, are tested for their applicability to ostracod systematics. For this comparison, two morphologically similar ostracod species (*Krithe compressa* and *Krithe iniqua*) whose genus-level systematics is still incompletely resolved, are selected. Twenty-nine right valves of each species were collected from the upper Pliocene samples at the Monte San Nicola section in southern Italy. Statistical analyses (MANOVA on morphometric shape variables, and D values) were utilized to test if geometric morphometrics and fractal analysis are appropriate into discriminating between the two species. Both methods succeeded in distinguishing the species statistically. The fractal analysis of the two ostracod species shows D values centered on  $1.31 \pm 0.02$  for *Krithe iniqua* and on  $1.40 \pm 0.02$  for *Krithe compressa*. Geometric morphometric analysis indicates significant differences between the two species and allows studying intra-population variability as well as. The most variable traits indicated by geometric morphometrics are vestibular area and posterior outline of the shell, indicating that these traits are the most relevant for the systematics of the species analyzed. Both fractal geometry and geometric morphometrics provide a measure of population variability. Fractal analysis has the advantage of being free from any subjectivity in the selection of characters and could be most appropriate to use for analysis of complex ornamentation for systematic purposes. However, a possible advantage of geometric morphometrics over fractal analysis is its ability to indicate where statistically significant variations in shape occur on the shell.

**Key words:** Ostracoda, *Krithe*, fractal geometry, geometric morphometrics, morphological variability, systematics.

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