Using 3D virtual surfaces to investigate molluscan shell shape

Noninvasive methods in shell shape variation may help to understand evolution, ecology, stress and role of molluscan in aquatic ecosystems. Imaging analysis is a suitable diagnostic tool in morphological studies to (1) evaluate the health status of investigated animals, and (2) monitor sea coastal habitats. We introduce the feasibility of the cone-beam computed tomography as an optimal technique for 3D surface scanning to obtain virtual valve surfaces of Mytilus galloprovincialis, and analyze them exploiting the geometric morphometric facilities. Statistical output revealed morphological difference between mussels coming from different extensive rearing systems highlighting how the entire valve surface contributed to discriminate between groups when we compared 2- and 3D analyses. Many factors drive the morphological differences observed in the valve shape variation between the two sites, such as geographical genetic differentiation, natural environmental effects and culture conditions. The simplicity of the proposed methodology avoids damage and handling of individuals, makes this approach useful for morphological data collection, and helps to detect detrimental agents for sea ecosystems by using molluscans.

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