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Potential paleoecologic biases from size-filtering of fossils: Strategies for sieving

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[1]www.sepm.org/archive/index.html.

ABSTRACT

The methods by which fossils are extracted from sediments can alter their observed size-frequency distributions, which can in turn alter observed paleoecologic patterns. Building on previous work, this study uses virtual sieving (i.e., replicated via subsampling on a computer) to test the effects of size filtering on the apparent ecologic composition of a database of Miocene mollusks in which the size of every specimen was measured. When simulated mesh sizes varied by nearly an order of magnitude (2–10 mm), the apparent relative abundances of tiering, motility, and feeding categories varied substantially in some individual bulk samples. Not surprisingly, the extent to which variations in mesh size affected the ecologic proportions of a sample depended in part on its size-frequency distribution. If the goal is to characterize the ecology of adult assemblages, the chosen mesh size should not be so small that juveniles dominate the results or so large that a majority of specimens are excluded. For many molluscan assemblages, 2–4 mm should often be appropriate. For preexisting data sets composed of heterogeneously collected data, there is a positive result: averaging samples together to produce a mean view of ecologic composition tends to remove the more egregious effects of the size-filtering bias. Thus, comparisons of the ecologic composition of single samples may be sensitive to mesh-size effects, but comparisons of regional or global faunas are likely more robust, and variations in size filtering may not be an obstacle to large-scale, secular comparisons of ecospace use. Measuring ecologic importance using biomass instead of abundance also reduced the effects of the mesh-size bias by reducing the influence of small-bodied individuals on ecologic proportions.