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# Absolute measures of the completeness of the fossil record

Mike Foote[1] & J. John Sepkoski, Jr[1]

1. Department of the Geophysical Sciences, University of Chicago, 5734 South Ellis Avenue, Chicago, Illinois 60637, USA

Correspondence to: Mike Foote[1] Correspondence and requests for materials should be addressed to M.F. (e-mail: Email: mfoote@midway.uchicago.edu).

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## Abstract

**Measuring the completeness of the fossil record is essential to understanding evolution over long timescales, particularly when comparing evolutionary patterns among biological groups with different preservational properties. Completeness measures have been presented for various groups based on gaps in the stratigraphic ranges of fossil taxa[1,2] and on hypothetical lineages implied by estimated evolutionary trees[3,4,5]. Here we present and compare quantitative, widely applicable absolute measures of completeness at two taxonomic levels for a broader sample of higher taxa of marine animals than has previously been available. We provide an estimate of the probability of genus preservation per stratigraphic interval[6,7], and determine the proportion of living families with some fossil record[8,9,10]. The two completeness measures use very different data and calculations. The probability of genus preservation depends almost entirely on the Palaeozoic and Mesozoic records, whereas the proportion of living families with a fossil record is influenced largely by Cenozoic data. These measurements are nonetheless highly correlated, with outliers quite explicable, and we find that completeness is rather high for many animal groups.**

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