8:45 AM Worona, Marc A.

LATE-QUATERNARY CLIMATE, VEGETATION, AND DISTURBANCE HISTORY OF THE WILLAMETTE VALLEY AND WESTERN CASCADE RANGE, OREGON

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Pollen, charcoal, and plant macrofossils preserved in the sediments of three lakes in western Oregon are used to describe the paleoenvironmental history across a Willamette Valley-Cascade Range transect. Pollen and plant macrofossils from sediment cores of Beaver Lake (65 m elev., basal date 10,500 yr B.P.), Buck Lake (870 m elev., basal date 10,000 yr B.P.), and Gordon Lake (1177 m elev., basal date 12, 500 yr B.P.) show that early Holocene vegetation assemblages included higher amounts of xerophytic taxa including Douglas fir (*Pseudotsuga menziesii*) and Oregon white oak (*Quercus garryana*) compared to today. These assemblages confirm that the early-Holocene climate of western Oregon was warmer and drier than at present. Late-Holocene pollen and plant macrofossil assemblages are characterized by an increased proportion of mesophytic taxa including western hemlock (*Tsuga heterophylla*) and western red cedar (*Thuja plicata*) indicating the establishment of the modern cool moist climatic conditions. Charcoal abundance in Buck and Gordon Lakes suggest that the fire regimes in the mid-Holocene differed from those in the late-Holocene on the western slope of the Cascade Range. The Beaver Lake charcoal record suggests that the mid-Willamette Valley experienced increased burning during the late-Holocene. This period of elevated charcoal abundance ended when Euro-Americans settled in the area.

9:00 AM Foote, Mike

INFERRING TAXONOMIC DURATIONS AND PRESERVATION PROBABILITY FROM THE STRATIGRAPHIC RANGES OF FOSSIL TAXA.

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Observed stratigraphic ranges are generally shorter than actual durations. Compensating for this bias has previously required detailed data on fossil occurrences. In contrast, we develop a method for estimating the original frequency distribution of taxonomic durations (therefore average extinction rate), preservation probability per unit time, and proportion of taxa preserved (paleontologic completeness), given only the observed distribution of stratigraphic ranges. In cases where occurrences within ranges are known, the observed pattern of occurrences agrees with that predicted by our method.

We start by assuming random preservation and constant extinction probability (therefore an exponential distribution of original taxonomic durations). This distribution is log-linear with slope equal to -q (q = extinction rate). *If we ignore taxa confined to a single stratigraphic interval*, then the remaining distribution of fossil ranges is also log-linear with the same slope. Thus, the true extinction rate can be derived from the observed ranges.

Let n_1, n_2, and n_3 be the number of fossil taxa having ranges of 1, 2, and 3 intervals, respectively. Then the probability of preservation per taxon per interval is equal to $n_2^2/(n_1 n_3)$. Thus, preservation probability and paleontologic completeness can be inferred from the observed ranges.

Under the stated assumptions, these results are exact. The approach outlined here can also be applied if we relax the assumptions of constant extinction and preservation probability. If preservation probability varies among taxa or over time, the mean probability of preservation is still approximately equal to $n_2^2/(n_1 n_3)$. Given this, a brute-force, trial-and-error method allows estimation of the original distribution of durations.

Applications of this approach show that: (1) the difference between bivalve and mammal taxa in apparent durations cannot be attributed to a difference in preservation potential alone; and (2) local completeness is high perhaps up to 90% at the