FORUM

Diachrony of mammalian appearance events: Implications for biochronology: Comments and Reply

COMMENT

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Alroy (1998) argued that there is significant diachrony in the firs and last appearance events (FAE and LAE) of Cenozoic mammals i North America, and therefore individual events cannot be used fo biochronology. A close examination of the data used in his paper, how ever, suggests that (1) most of the diachrony is largely a sampling artifact and (2) once sampling is factored out, the remaining apparent diachron would have little effect on the biochronological correlations that have been established for over a century.

These points are demonstrated by Alroy's (1998, Fig. 1A) plot of FAEs of the Midcontinent regressed against the FAEs of the West Coast. Almost all of the outliers are on the West Coast side of the regression line, and there are large gaps in the data for most of the Paleocene–early Eocene (Puercan–Wasatchian) and late Eocene–late Oligocene (Chadronian–Whitneyan). Both of these effects are due to well-known gaps in the West Coast mammalian record (see chapters in Woodburne, 1987), which has yielded only one sparse assemblage of Paleocene age, only two sparse Wasatchian assemblages, and no Chadronian, Orellan, or Whitneyan assemblages. (Alroy [personal commun.] includes the Chadronian Kishenehn faunas of eastern British Columbia as "West Coast," but these faunas are really a part of the Rocky Mountain region, both geologically and faunally.)

Any comparison between two such unequal records will inevitably yield large diachrony values, simply because of the large stratigraphic gaps in the West Coast. Alroy (personal commun.) provided me with a list of the ten "worst offenders" among FAEs. Most of these taxa (*Thylacaelurus, Domnina, Pseudotrimylus, Mystipterus, Anchitheriomys, Nyctitherium, Plionictis, Mytonomys, Paramys, Leptodontomys*) are small, relatively rare mammals that rarely have been important in biochronology. In addition, anyone with extensive first-hand experience in identifying the Miocene faunas of the West Coast knows they are much scrappier and less complete than those of the Midcontinent, with many erroneous or tentative identifications based on fragmentary specimens. If many of these uncertain identifications were thrown out, the apparent diachrony might diminish even further.

Instead of including all available taxa, most of which are rare and subject to sampling problems and historically have not been important in North American mammalian biochronology, Alroy's point would be better demonstrated if he were to focus on mammals (such as those given by Woodburne, 1987, Fig. 10.1) which were explicitly designated as index taxa for mammalian biochronology. If this list were to show significant diachrony (greater than the available chronologic resolution), then there might be serious concern about using fossil mammals as time indicators. But comparisons based on rarely sampled taxa that were not important to the original biochronologic framework are of dubious value.

I thank John Alroy for providing data, and S. L. Walsh and M. O. Woodburne for comments.

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