

**Comment and Reply**  
**The extinction of the dinosaurs in North America, David E. Fastovsky and Peter M. Sheehan, *GSA Today*, v. 15, no. 3, p. 4–10.**

## Comment

**James E. Fassett**, 552 Los Nidos Drive, Santa Fe, New Mexico 87501, USA, jimgeology@qwest.net

“The extinction of the dinosaurs in North America,” by Fastovsky and Sheehan in the March 2005 issue of *GSA Today* addressed two controversial topics: the rate of decline in dinosaur diversity approaching the Cretaceous-Tertiary (K-T) boundary and the “instantaneous extinction” of the dinosaurs at the K-T boundary in North America.

Addressing the “instantaneous extinction” topic, Fassett and others (2002) provided two independent lines of evidence supporting the presence of Paleocene dinosaurs in the San Juan Basin of New Mexico: (1) Paleocene index palynomorphs that are present stratigraphically below dinosaur bone at two localities, 35 mi apart, in the San Juan Basin; and (2) dinosaur bone that is found in abundance in the southern part of the basin in magnetochron c29N in the Paleocene Ojo Alamo Sandstone. These data not only indicate that dinosaurs survived beyond the end of the Cretaceous in the San Juan Basin, but because of the precise dating of c29N on geologic time scales, we know that the surviving dinosaurs lived on into the Paleocene for about 1.0 m.y. It is thus puzzling why Fastovsky and Sheehan have ignored the Fassett et al. (2002) publication that directly refutes their claim that dinosaur extinction in North America was “geologically instantaneous” at the K-T boundary.

Even though biostratigraphic data in Wyoming and Montana may indicate the sudden extinction of dinosaurs at the K-T boundary, compelling biostratigraphic data from New Mexico show that these fascinating creatures lived on into the Paleocene for another 1.0 m.y. and thus did not become “instantaneously extinct” at the end of the Cretaceous.

### REFERENCES CITED

Fassett, J.E., Zielinski, R.A., and Budahn, J.R., 2002, Dinosaurs that did not die: Evidence for Paleocene dinosaurs in the Ojo Alamo Sandstone, San Juan Basin, New Mexico, in Koeberl, C., and MacLeod, K.G., eds., Catastrophic events and mass extinctions: impacts and beyond: Boulder, Colorado, Geological Society of America Special Paper 356, p. 307–336.

Fastovsky, D.E., and Sheehan, P.M., 2005, The extinction of the dinosaurs in North America: *GSA Today*, v. 15, no. 3, p. 4–10, doi: 10.1130/1052-5173(2005)015<4:TEOTDI>2.0.CO;2.

doi: 10:1130/1052-5173(2005)015<11:TEOTDC>2.0.CO;2

## Reply

**David E. Fastovsky**, Department of Geosciences, University of Rhode Island, Kingston, Rhode Island 02881, USA, defastov@uri.edu; **Peter M. Sheehan**, Department of Geology, Milwaukee Public Museum, 800 W. Wells St., Milwaukee, Wisconsin 53223, USA, sheehan@mpm.edu.

Our conclusion (Fastovsky and Sheehan, 2005), that non-avian dinosaurs underwent a geologically instantaneous extinction, is unaffected whether Fassett is wrong (the “Paleocene” dinosaurs are actually Cretaceous) or right (a few dinosaurs survived into the Paleocene).

*Fassett is wrong:* Fassett cites two instances of pollen-dated dinosaur material, as well as magnetostratigraphic evidence. The first instance, an isolated femur, is likely reworked. In the second, re-analysis of pollen from the same locality indicates a Maastrichtian age (Sullivan et al., 2003). This is concordant with the recovery, in the same deposits, of Maastrichtian mammalian index taxa (Weil and Williamson, 2000).

With the biostratigraphy unresolved, the assignment of normal and reversed magnetic polarity zones in the SJB to global magnetochrons remains tenuous. The issue is further complicated by the likelihood of post-Paleocene remagnetization (Butler, 1985). We thus cannot rule out the possibility that the stratigraphy proposed by Fassett is flawed.

*Fassett is right:* Consider an analogy by paleontologist Peter Dodson (1993, personal commun.): we might see a Model T on the road, but we would never conclude that the car was part of a modern automotive (metaphorical) ecosystem. Even if a few dinosaurs survived a million years past the K-T boundary, dinosaurs were casualties of an extinction that, the best evidence suggests, was geologically instantaneous.

### REFERENCES CITED

Butler, R.M., 1985, Mineralogy of magnetic minerals and revised magnetic polarity stratigraphy of continental sediments, San Juan Basin, New Mexico: *Journal of Geology*, v. 93, p. 535–554.

Fastovsky, D.E., and Sheehan, P.M., 2005, The extinction of the dinosaurs in North America: *GSA Today*, v. 15, no. 3, p. 4–10.

Sullivan, R.M., Lucas, S.G., and Braman, D.R., 2003, No Paleocene dinosaurs in the San Juan Basin, New Mexico: *Geological Society of America Abstracts with Programs*, v. 35, no. 5, p. 15.

Weil, A., and Williamson, T.E., 2000, Diverse Maastrichtian terrestrial vertebrate fauna of the Naashoibito Member, Kirtland Formation (San Juan Basin, New Mexico) confirms “Lancian” faunal heterogeneity in western North America: *Geological Society of America Abstracts with Programs*, v. 32, no. 7, p. 498.

doi: 10:1130/1052-5173(2005)015<11:TEOTDR>2.0.CO;2