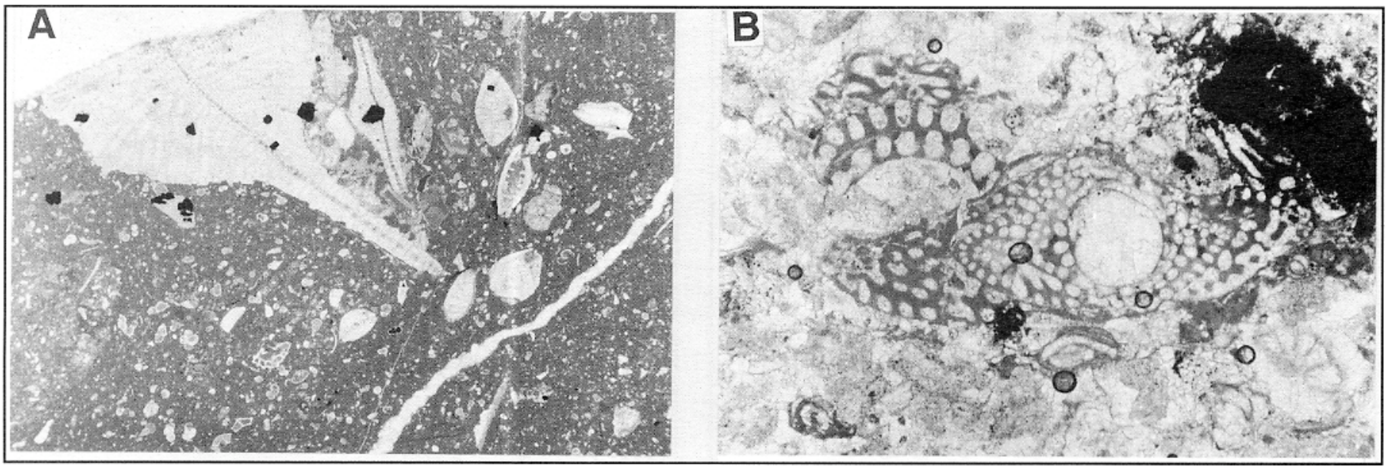

Figure 23. Bochil, Chiapas, Mexico. Thin sections of mass-flow components. A, Loose orbitoid foraminifer, from base of 50-m-thick mass-flow, underlying the K/T sandstone complex. B, Loose, *Murciella* sp., an upper Maastrichtian miliolid (lagoonal) foraminifer. These *Murciella* appear at the top of the K/T sandstone, as in nearby outcrops in Guatemala (Hildebrand et al., 1994), and may have been flushed from lagoons on the nearby carbonate platform.

belong to the depositional sequence of the K/T sandstone because it appears to be grading into the K/T sandstone. However, mass-flows that are similar but thinner, containing the same components, occur already in the Maastrichtian.

Apparently the Bochil area was at a slope setting at K/T boundary time, near a carbonate ramp, where thick mass-flows could have been triggered by the seismic shaking of the Chicxulub impact.

Los Ramones, Mexico

A small K/T sandstone complex outcrop occurs in the east bank of the Rio Pesqueria (Alvarez et al., 1992b). Unit I is almost absent and contains very few bubbly spherules at the base, mostly as armoring of the many clay pebbles. On some of the mud-clasts oriented current-crescents occur upstream of the spherules of the armoring. Unit II is massive, contains many stringers of clay pebbles, and fills a single channel (max. 440 cm thick, axis strikes N140°E) that is loaded into the Maastrichtian Mendez Formation. A Unit III is absent, but the flat top of the sandstone complex is marked by several 30-cm-large crescent scours (direction N140°E), with superimposed current ripples (N230°E) running at an oblique angle to the channel axis.

Overlying sediments are not exposed for over 5 m; the first sediments exposed are Velasco shales, containing *M. pseudobulloides.*

Rancho Nuevo, Mexico

Two adjacent channels, ~7 m wide (strike of channel axis N130°E), are exposed on the east bank of the Rio San Juan (Alvarez et al., 1992b). Unit I is 0 to 15 cm thick, channelized, almost entirely composed of bubbly spherules. Unit II is massive, maximum 6.5 m thick in the center of the channels, reduced to zero between the two channels. The massive sandstones display faint water-escape structures. Between the two channels (5 m apart) the Mendez shale is pushed up in large, deformed "flame-structures" or diapirs. At the base of Unit II frequent flute-casts occur, showing a current direction parallel to the channel axis (N110°–140°E), but some deviating directions were also measured (N80°E–N260°E). At the base imprints of siliceous sponges occur. Unit III is poorly exposed, but several (30 to 40 cm thick) fine sandstone layers with climbing ripples occur on top of Unit II. The transition from Unit III sandstone to the Paleocene marls is not exposed over 30 cm; then follow Paleocene Velasco marls containing *G. eugubina.*

Parras basin, northeastern Mexico

The K/T boundary has been described by Kauffman and Hansen (1987), who described a chaotic sedimentary breccia/conglomerate as a giant storm or tsunami bed within the dominant siliciclastic offshore to shoreface Maastrichtian-Danian siliciclastic sequence of the Parras basin. The K/T boundary was drawn between the sudden extinction of *Exogyra* and the appearance of a Paleocene mollusc *(Cucullea)* in a prominent middle shoreface sandstone bar, with abundant hummocky cross-stratification. We have investigated the outcrop, but we have not found any evidence for a chaotic breccia in the K/T interval. We found exfoliated sandstone boulders resembling a boulder bed. This site is clearly the shallowest, more or less continuous marine sequence across the K/T boundary, regarding the highly fossiliferous sequence of the wave-rippled offshore sandstone bars across the K/T boundary.