Bio- and Sequence Stratigraphy of the Upper Portion of the Kincaid Formation, Frost Bluff, Milam County, Texas

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A sequence biostratigraphic interpretation of the upper Pisgah and Tehuacana members of the Kincaid Formation, exposed at Frost Bluff along the west bank of the Brazos River in Milam Co, Texas, is based on 27 m of measured section and ten samples analyzed for foram biostratigraphy. The P1c-P2 zonal boundary occurs at approximately 11 m above the base of section, in the upper portion of the Pisgah mbr. This implies the Pisgah mbr. is part of cycle TA1.3 of Haq et al. (Fig. 1). A sequence boundary is interpreted at the base of the Tehuacana mbr. of the Kincaid Fm., based on the abrupt shift from mud-dominated to sand-dominated deposition and is correlated to the base of cycle TA1.4. Lithologic and faunal characteristics suggest the basal 0-2.2 m of the measured section is part of the TST/Condensed Interval of TA1.3. Sediments of this interval are interpreted as deposits of deep outer neritic (150-200 m) normal marine environments. The foram fauna comprises abundant and diverse planktic and deep-shelf benthic assemblages. The base of HST of cycle TA1.3 lies at the base of a silty bed at 2.5 m. This interval records increasing siltiness and systematic upward decreases in diversity of deeper-water benthics and overall relative abundance. Interpreted paleobathymetry at the top of the sampled section is middle neritic (50-100 m).

The planktic zonation of Berggren et al. (1995) is applied in this study. The P1c-P2 boundary is arbitrarily placed halfway between samples 15.5 m and 7.0 m, based on the presence of *Globorotalia uncinata* at 15.5 m and its absence at 7.0 m and below. Therefore the uppermost 6m of the Pisgah mbr. are placed in the P2 Interval Zone. *Globorotalia inconstans* (=*Globorotalia trinidadensis*) ranges throughout the measured section, indicating the FAD of *Glr. inconstans* is below the base of the measured section and that the interval 0.0 m-11 m should be placed in the P1c Interval Subzone. The planktic fauna of the Frost Bluff section includes *Globigerina daubjergensis, Globigerina moskvini, Globigerina triloculinoides, Globigerina fringa, Eoglobigerina eobulloides, Globorotalia compressa, Globorotalia inconstans, Globorotalia archaeocompressa, Globorotalia pseudobulloides, Globorotalia uncinata, Woodringina claytonensis, Chiloguembelina morsei, Chiloguembelina midwayensis*, and *Globoconusa conusa*. These species are common in lower Danian, Early Paleocene faunas worldwide. Most were noted by Keller (1989) in the nearby K/T boundary section along the Brazos River in Falls County. The benthic zonation of Fluegeman et al. (1990) is not applied in the Frost Bluff section due to overlap of zonal markers *Eponides elevatus* and *Alabamina midwayana*.

Fauna of the lower 2.2 m is characterized by planktic diversity >6, calcareous benthic diversity ≥22, P/B ratio ≥0.23, and high relative abundances for planktics and benthics, resulting in the interpretation of outer neritic (150-200 m) paleobathymetry. Especially significant is the diversity and high abundance of a group of benthics known to prefer deep shelf environments. This group (see Fig. 2) includes elongate-rectilinear forms such as *Nodosaria*, *Dentalina*, and *Vaginulina*, plus species of *Lagena, Bulimina, Epistominella, Siphonina, Siphogenerinoides, Oridorsalis*, and *Polymorphina*.

Above 2.2 m, a shallowing-up trend is revealed by decreases in diversity and abundance of the planktic and benthic assemblages, especially the deep-shelf benthic assemblage. This shallowing-up may represent slow sea-level fall, filling of accomodation space by silty highstand deposits, or both. The determination of middle neritic (50-100 m) paleobathymetry at the level of the highest sample (15.5 m) is based on a drop in planktic diversity to 5, benthic diversity of 11, low relative abundances, and the disappearance of most of the deep-shelf benthic assemblage. A P/B ratio of 0.45 is calculated at this level because planktic diversity drops slowly through the HST to the low value of 5, while the benthic diversity is dropping more dramatically from 31 to 11.

The P1c Subzone interval at the base of the Frost Bluff section appears to record the deepest paleoenvironment in the Brazos River area, deposited during maximum flooding of the Paleocene. Underlying basal Danian deposits of the nearby Brazos K/T boundary section are reported to have accumulated in middle neritic environments, while strata of the overlying Wills Point Formation are considered to have accumulated in middle-inner neritic environments. Superimposed on the bathymetric changes is a trend of increasing rate of sediment accumulation during the Paleocene.

References

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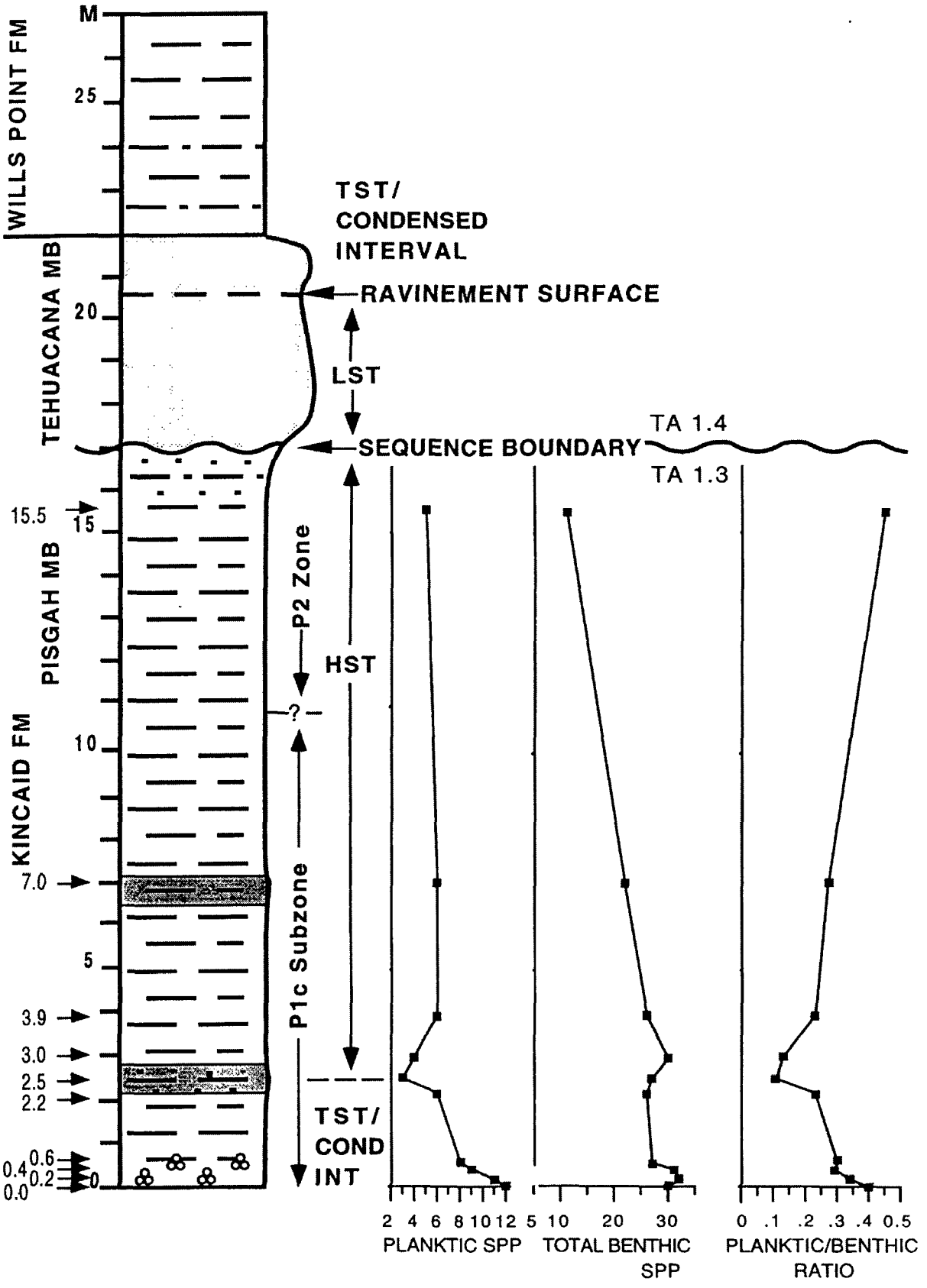

Figure 1. Summary of litho-, bio-, and sequence stratigraphy for the Frost Bluff section.

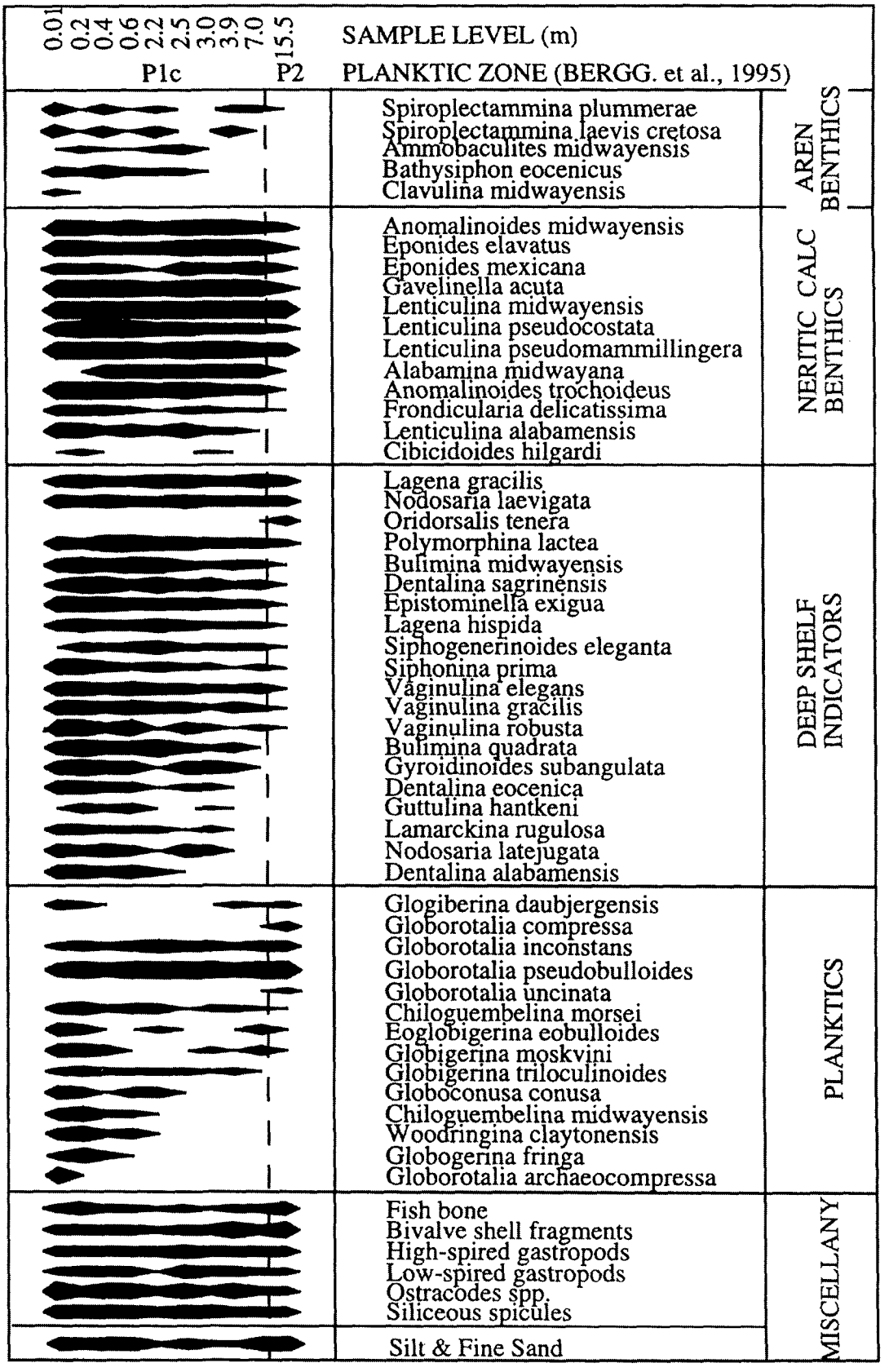

Figure 2. Distribution chart of faunal, miscellaneous, and lithologic constituents of samples, Frost Bluff section.