DETAILED PALAEONTOLOGIC AND TAPHONOMIC TECHNIQUES TO RECONSTRUCT THE EARLIEST PALEOCENE MEGAFLORA: AN EXAMPLE FROM SOUTHWESTERN NORTH DAKOTA, USA

Antoine BERCOVICI[*], Jacqueline WOOD[**], Dean PEARSON[***]

[*]***UMR 6118 du CNRS, Géosciences Rennes, Bat. 15 – Université de Rennes 1, Campus de Beaulieu, 35042 Rennes Cedex, France.***
[**]***Delgado Community College, Department of Science and Math, 615 City Park Avenue, New Orleans, LA 70119 USA.***
[***]***Pioneer Trails Regional Museum, Paleontology Department, 12 First Avenue NE, Box 78, Bowman, ND 58623 USA.***

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Abstract: Multiple stratigraphical sections in the basal Fort Union Formation were used to analyze environmental recovery following the terminal Cretaceous extinction event. At one of these sites (V02017), a well documented fossil record has made it possible to reconstruct the local environment using vertebrates, palynology and macrofloras. This report will focus only on the macroflora from this site, located just above the Cretaceous-Tertiary (K/T) Boundary, where the first appearance data for Paleocene floral recovery can be observed. The macroflora consist of leaf mats deposited in a near-stream paleoenvironment associated with short-term flood events. Detailed information was gathered by cutting a stratigraphic column from the Hell Creek/Fort Union formational contact up through the basal four meters of the Fort Union Formation. The stratigraphic column was made wide enough to expose a surface of at least one square meter and to a depth of a meter to get beyond the weathered sediments.

The lithology immediately above the formation contact coal consists of a 112 cm thick mudstone and silty mudstone representing lacustrine environments. Above the lacustrine deposits is a 21 cm thick siltstone and sandstone deposit where reworking is identified by the presence of both Maastrichtian and Albian marine dinoflagellates, acting as a transition zone between the lacustrine environment below and the terrestrial deposits above. The lithologic unit that contains the leaf mat analyzed in this study lies in a 15 cm thick silty mudstone superimposed upon this transitional zone which preserves the first terrestrial component following the K/T boundary, placed in the mudstone below by using a new palynological criteria determined by relative abundance.

A 0,5 m^2 surface by 35 cm thick block of matrix including the leaf mat was plaster-jacketed and taken to the museum laboratory in Bowman, N.D. for analysis under controlled conditions. Work consisted of removing sediments at a millimeter scale and recording placement and orientation of all fossil materials for three-dimentional drawings. The observations showed that the leaf mat consists of tightly stacked leaves preserved as carbon imprints, usually seperated by thin mud laminations. Using this technique, a description and census of more than 300 leaf specimens was possible. These specimens represent a low-diversity Fort Union flora composed exclusively of dicots not seen in the Hell Creek Formation. Major changes in taxa abundances correlated with different lithologies were revealed, three main zones can be identified:

1) From the base of the leaf mat, also corresponding at the base of lithological unit #9, the first 5 cm thick mudstone layer is composed of fragmented reeds, *Platanus raynoldsii* and *Cornophyllum newberryi* leaves and *Cercidiphyllum* seeds.

2) A 4 cm interval is present in the center of the leaf mat which consists of a siltier component at the top of lithologic unit #9. This zone is dominated by a leaf species previousely described in the Paleocene of the Denver Basin, but is reported here for the first time in the study area.

3) The top zone from the base of lithologic unit #10 is represented by a mudstone with a very dense mat of large *Platanus raynoldsi*. The leaf density gradually decreases as the lithology changes from mudstone to silt.

On a taphonomical perspective, most of the leaves shows signs of maceration, whereas few present cracks and fragmentation. This can be explained by a short residence time of the leaves on the open ground. Chances are that most of the leaves were rapidly transported by wind to be collected by slow moving water. They are deposited in areas of lowest hydrodynamism, represented by all three identified zones in the stratigraphic section. The assemblage described here represents a collection from a fairly broad area of the local floodplain dominated by streams.

Palynological analysis shows that lithologic units #9 and #10 contains a numerical abundance of 99.8% specimens known to cross the boundary, whereas the macroflora described here is composed of 100% new Paleocene forms. These findings suggest the plants composing this Fort Union macroflora are not the same as the

ones that have produced the pollen found in lithologic units #9 and #10.