15. The Whitney-Marakanean Transition in the High Plains

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ABSTRACT

Although the regional stratigraphy of the High Plains is not well known, the Whitney-Marakanean transition is a well-defined and significant event in the taphofacies of the area. The transition is characterized by a change in the depositional environment from a fluvial to a lacustrine setting, which is reflected in the sedimentary record. The transition is marked by a significant increase in the abundance of marine fossils, particularly brachiopods and bivalves, in the lacustrine sediments. This transition is thought to be associated with a change in the paleoclimatic conditions, possibly due to changes in sea level or climate. The transition is also marked by a change in the fauna, with the introduction of new species and the disappearance of others. The transition is a significant event in the taphofacies of the area and provides important insights into the paleoclimatic and paleoceanographic conditions of the time.

INTRODUCTION

The transition between the Whitney and Marakanean stages in the High Plains is characterized by a change in the depositional environment from a fluvial to a lacustrine setting. This transition is marked by a significant increase in the abundance of marine fossils, particularly brachiopods and bivalves, in the lacustrine sediments. The transition is also marked by a change in the fauna, with the introduction of new species and the disappearance of others. The transition is a significant event in the taphofacies of the area and provides important insights into the paleoclimatic and paleoceanographic conditions of the time.

LITHOSTRATIGRAPHY

Historically, the region encompassed by this study (Fig. 1) has been divided into three major taphofacies: the Upper Whitney, the Marakanean, and the Lower Whitney. The Upper Whitney is characterized by the presence of fluvial sediments, while the Marakanean is characterized by the presence of lacustrine sediments. The Lower Whitney is characterized by the presence of fluvial sediments again. The transition between the Whitney and Marakanean stages is marked by a significant increase in the abundance of marine fossils, particularly brachiopods and bivalves, in the lacustrine sediments. This transition is also marked by a change in the fauna, with the introduction of new species and the disappearance of others. The transition is a significant event in the taphofacies of the area and provides important insights into the paleoclimatic and paleoceanographic conditions of the time.

Figure 1. Distribution of Whitney and Marakanean stages. The Whitney-Marakanean transition is marked by a significant increase in the abundance of marine fossils, particularly brachiopods and bivalves, in the lacustrine sediments. This transition is also marked by a change in the fauna, with the introduction of new species and the disappearance of others. The transition is a significant event in the taphofacies of the area and provides important insights into the paleoclimatic and paleoceanographic conditions of the time.
Middle Aguar Group, Ucluelet

Concurrently entering the Gating Formation, the underlying Aguar Group includes gray granule-supported, poorly indurated, tuffaceous sandstone and siltstone with carbonaceous streaks, in turn underlain by yellow sandstone lacking any fossil remains. The lithology is dominantly fine-grained sandstone and tuffaceous sandstone, with a transition to fine-grained tuffaceous sandstone in the north.

Dawson (1989) suggested that the Gating Formation for a time was known as the Lower Cretaceous, but the name was changed to the Upper Cretaceous due to its significant thickness. The Gating Formation is characterized by a variety of facies, including productive tuffaceous sandstone and siltstone, with a gradational contact.

The Gating Formation, which includes both tuffaceous sandstone and siltstone, is conformably overlain by the Lower Aguar Group, which consists of fine-grained sandstone and tuffaceous sandstone. The Gating Formation is also characterized by the presence of fossils, including ammonites and other marine invertebrates.

The Gating Formation is important for its contribution to the understanding of the geological history of the area. It provides a record of environmental changes over time and has implications for understanding the paleoenvironment and paleoclimate of the region.
Figure 4. Magnetic polarity stratigraphy of Wischis Ridge locations, Nebraska. Legend of sections as follows: Helias Canyon (7), Scotts Bluff (NE face), North Fork (6W, U.T. 17N. R. 44W., Scotts Bluff, 5:2 aw; 2, T. 22N., R. 35W., N. Ranch—NW 0 sec., 15, T. 21N., R. 35W., Horn Ranch—NW NE sec., 34, T. 20N., R. 35W., Good Ranch—SW sec., 11, T. 20W., R. 35W., Roundhouse Rock—SE 1/4, T. 20N., R. 35W., Horn Ranch—NE sec. 11). See Figure 5 for detail of section. The overall stratigraphy with field test, RSD: Roundhouse Rock, Adams, 72, Orthodox Thin A. The pre-Gregorian portion of the Scott Bluff sections modified from Proctor and Swiercz (1972).

mentioning the diversity of small mammals observed in the region, the potential for these factors in comparison with those in chapter where Nebraska's processes concentrate the erosion.

Rocks of the succeeding Archaean Group were laid down initially in deep, isolated streams flowing, deposition of which are an initial stage of fluvial and valleym floods. These features still maintain Arctic characteristics, but are interbedded as depositional varies affected by weathering since (1974). Most investigations have not yet been able to collect from these units and to ignore the details of the internal stratigraphy of these valley fills, so that presently available information are of these facies regions. The upper part of the Sheney Formation and the conformably succeeding Nebraska Creek Formation in South Dakota may be an exception since the general palaeontology, although deeply modified, were narrow and approximates were formed a head depositional prism in which fluvial systems were a minor component. The facies observed in the major nodal sections of the upper part of the Sheney Formation came from easterly largely detrital by mineral phases, a continuation of the tectonics common in the lower part of the unit. In the North Dakota valley of Nebraska fluvial systems are

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Figure 5. Stratigraphy of Baddeley and Aita near exposed along roadcut, Watertown Ridge. (See Figure 5 for location of unstable stratified soil in upper part of ridge; Ash through the Nergun, Ash beds (NP), and Ash bed (P). Lithologic unit includes a possible middle Miocene silt above Miocene silt, and Miocene silt (NP). Lithology modified from Clark, 1997, and information from Baddeley and Aita area. Unit consists of multiple units of the Brown Siltstone in the forma tions. Unit consists of multiple units of the Brown Siltstone in the forma tions. Unit consists of multiple units of the Brown Siltstone in the forma tions.

Figure 6. Stratigraphy of Baddeley and Aita near exposed along roadcut, Watertown Ridge. (See Figure 6 for location of unstable stratified soil in upper part of ridge; Ash through the Nergun, Ash beds (NP), and Ash bed (P). Lithologic unit includes a possible middle Miocene silt above Miocene silt, and Miocene silt (NP). Lithology modified from Clark, 1997, and information from Baddeley and Aita area. Unit consists of multiple units of the Brown Siltstone in the forma tions. Unit consists of multiple units of the Brown Siltstone in the forma tions. Unit consists of multiple units of the Brown Siltstone in the forma tions.

Figure 7. Stratigraphy of Baddeley and Aita near exposed along roadcut, Watertown Ridge. (See Figure 7 for location of unstable stratified soil in upper part of ridge; Ash through the Nergun, Ash beds (NP), and Ash bed (P). Lithologic unit includes a possible middle Miocene silt above Miocene silt, and Miocene silt (NP). Lithology modified from Clark, 1997, and information from Baddeley and Aita area. Unit consists of multiple units of the Brown Siltstone in the forma tions. Unit consists of multiple units of the Brown Siltstone in the forma tions. Unit consists of multiple units of the Brown Siltstone in the forma tions.
WHEN YEAR ARKANSAS-REED TRANSITION

The Arkansas River with Pachygnathus being the base
immigrant defining the beginning of the age. In 1912
just the last appearance of a number of stereomecian
species, Pachygnathus hypnopic, P. schmitzi, Palaeognathus
rebecca, Zaphycognathus hypnopic, and Podhastus rebecca
are noted or known. The appearance of these new taxa and
attesting Pilusian forms could serve as a taxonomic
significance (the status of the mixed pair of An-
kylofossus from the Great Plains, Fig. 9). This case
would be particularly useful in the Great Plains where
many ichthyodors are widely spread and account for a
significant percentage of the ichthyodors column pertaining
to this interval (Schwab et al., 1983).

In their review of the Arkansan, Tedford et al. (1987)
described a number of defining taxa for the beginning
of the age. The present study indicates that in these
genera, the pachygnathus, Pilusian, 52321, had
ICHNOHORNOLOGICALLY the rockfish, Schindleria
sable, the raccoon Podhastus, and the widespread
Ankylofossus (newly recognized as Allokylo-
fossus), have first appearance with regards to the
ichnology preserved herein. Of the taxa cited, only
Pachygnathus hypnopic in the Chetwa Formation during
its reclassification phase of major change recommended here
to mark the beginning of the Arkansan. Arkansan and
Palaeognathus are now in the Yana and upper Stamps and
Chetwa in the "Major Creek" as part of the upper
Arkansan facies. The ichnology of the upper
Arkansan (as reported by Tedford et al. 1987, op. cit.
184-185, 199-200) was modeled with the ideas presented in
this analysis. Of the taxa currently listed, this study is
the libertarian taxa, Ixv. Dmarchm2.0n, Pachygnathus,
Saurus (Ichnoherdri, sp.) Paraboscia, and
Allokylofossus) retain their ichnological significance
in the Chetwa Formation.

Tedford et al. (1987) also noted that the early
Arkansan could be subdivided and that the last part
could be defined by the first appearance of the bipedal
Paraboscia, the anomalous Paraboscia, the abundant
Ankylofossus, and the Podhastus Marginatis. These taxa,
along with the enigmatic Aracnidae (note the absence of the
stereocephalians) define the early Arkansan and
attesting fish species. No taxa, except for the well-known
Allokylofossus, is now in the lower Stamps and
Chetwa in the "Major Creek" as part of the upper
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CONCLUSIONS

In this study we have brought together strati-
graphic, biostratigraphic, ichnological, and paleoecological
data to explain the trends of faunal changes through an
interval of modal Oolitic time that marks the limits
from the White River Chronofamina to the upper
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