

A paleoecological model of the vertebrate bearing beds in the Tlayúa Quarries, near Tepexi de Rodríguez, Puebla, México

Luis ESPINOSA-ARRUBARRENA & Shelton Pleasants APPLGATE

Abstract

The Tlayúa Formation of middle or upper Albian age is best exposed in the Tlayúa quarries near Tepexi de Rodríguez, Puebla, México. The formation is composed of three members: the upper, a gray dolomite, the middle, a honey-colored "lithographic" limestone with hematitic layers forming numerous and distinct "varves", and the lower, a gray bioturbated limestone. It is hypothesized that these beds have been formed in a backlagoon behind a barrier in front of which, a bio-rich lagoon existed and was bordered to the east by a large barrier coral reef. West of the Tlayúa backlagoon existed a low lying penepain made up of eroded clays. This land surface was semiarid with times of seasonal rains or storms. In the rainy season, a slow-moving river or rivers emptied into the backlagoon. Water depth in the Tlayúa lagoon varied from 1.5 meters (or less) to perhaps as deep as 10 meters. The depositional features of an interesting small crocodile indicate that at one time there was a depth of 1.5 meters. Algal mats were abundant, particularly in the upper beds. The preservation could have been aided by these mats, as well as, by anaerobic and or hypersaline conditions. The excellent and numerous fossils in the Tlayúa beds offer an opportunity to study a unique paleoenvironment in conjunction with present day back bays of a similar nature.

Introduction

In México, the development of paleontology has always been linked to the needs of the geological surveys, performed mostly by the Institute of Geology of the National Autonomous University of México (UNAM). This means that the scope of most paleontological investigations has been confined to the taxonomical descriptions of the paleobiotas, their age determinations and general statements pertained to the paleoenvironments (such as shallow waters, oceanic deposits, etc.). Since last century, a number of fossil localities in the country have been extensively exploited and collected, but none has been of the quality of preservation necessary to be considered a Lagerstätte. The emphasis of the investigations has been more related to the taxonomic, biostratigraphic, and paleogeographic implications of the organisms. Until this study, little attention has been paid to the paleoecological concerns of the paleobiotas and their environments.

Therefore, it can be said that paleoecology is a discipline still very young in México. Nevertheless, there is one region near the town of Tepexi de Rodríguez, Puebla, known as Tlayúa. This locality, with a surface of approximately 1.5 hectares, possesses all the attributes that have to be considered in a Lagerstätte, as defined by SEILACHER (1970).

Since its discovery, a number of paleoecological models and ideas have been proposed to explain the unique conditions that brought together the exquisite preservation and abundance of fossils to be found in this Mexican "mother lode". These ideas have been the result of an ongoing program of geological and paleontological investigations (APPLGATE 1987, MARTILL 1989, MALPICA et al. 1989, PANTOJA-ALOR 1992). Nevertheless, during the last few years, new and significant evidence has come to our attention, modifying a number of foregoing concepts and ideas. Because of this, we have found it necessary to present in this paper an updated paleoecological model in which the pertinent data are synthesized, and can be used as a framework to better understand this rich paleobiota and its depositional environment.

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