

The Campanian-Maastrichtian rudist bivalves succession in the Chiapas Central Depression, Mexico



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ABSTRACT

The restudy of the Late Cretaceous rudist fauna of the Chiapas Central Depression, considered Campanian-Maastrichtian with no more precisions in literature, reveals that, in fact, three successive rudist assemblages occur: (1) a lower one, early and middle Campanian, in the uppermost part of the Sierra Madre Formation (distinguished as Suchiapa Formation); (2) a middle one, early Maastrichtian, in the upper part of the Ocozocoautla Formation; and (3) an upper one, late Maastrichtian, in several horizons within the Angostura Formation. Published data on planktic and benthic foraminifers and inoceramid bivalves, as well as new findings of ammonites, helped bracketing the age of the three rudist assemblages. Their stratigraphic position fits with a depositional model assuming a basal carbonate platform fragmented into blocks each following a different tectono-sedimentary evolution: (1) a drowned block constituting the Tuxtla Gutiérrez Basin, deepening towards the neighbor raised block and receiving terrigenous material from the emerged Sierra Madre de Chiapas, that, after a long hiatus, was filled up and, subsequently, a marginal shallow carbonate platform, surrounded by a detritic belt and prograding towards the basin, installed on top; (2) a raised block constituting a high where, after a long hiatus, an insular shallow carbonate platform installed.

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1. Introduction

Besides some older specific papers (Müllerried, 1931a, 1931b, 1933, 1934, 1936a), the Late Cretaceous rudist fauna from Chiapas is mainly known after Alencáster (1971). Alencáster's monograph was based on the copious fossils collected by F. K. G. Müllerried (1891–1952) and kept at the Instituto de Geología in Mexico City. Concerning geography all the studied rudist samples were properly referred to Müllerried's localities, but their stratigraphic relationship was not well known. In fact, geologic maps available at that time only distinguished the Upper, mid, and Lower Cretaceous.

Thus, the Late Cretaceous rudist fauna from Chiapas has been traditionally considered Campanian-Maastrichtian, with no more precisions. Other recent taxonomic papers (Alencáster and Michaud, 1991; Alencáster and Pons, 1992; García-Barrera et al., 1998) have not improved its biostratigraphic accuracy.

The Upper Cretaceous stratigraphy of Chiapas has dealt with since long ago (Sapper, 1894, 1899, 1906, 1937; Böse, 1905; Ver Wiebe, 1925; Müllerried, 1930, 1936b, 1942; Imlay, 1944; Gutiérrez Gil, 1956; Webber and Ojeda, 1957) although much confusion and controversy remained concerning the recognized lithologic units, and their correlation and age. Chubb (1959) corrected some of the misconceptions of the earlier authors and tried to “search for these [Müllerried's] localities in the hope of establishing the rudist horizons and correlating them with the lithological succession”. Chubb's work, besides clarifying the lithological succession, represented a considerable advance in understanding the geologic history. He was not equally successful in establishing the rudist horizons and correlating them with the lithological

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succession, probably because Müllerried's rudist localities were rarely recorded with precision, and also because, several of the rudist identifications by this last author and consequently, their age attribution, were erroneous. Most subsequent stratigraphic research on the Cretaceous of Chiapas remained unpublished as internal reports of both the Instituto Mexicano del Petróleo or Petróleos Mexicanos although some relevant data were published (Castro-Mora et al., 1975; Sánchez-Montes de Oca, 1979; Quezada Muñetón, 1990; Alzaga, 1997; Padilla Sánchez, 2007). Steele's (1987) and Waite's (1987) papers focused only on the Sierra Madre Limestone. The doctoral thesis of François Michaud and subsequent papers (Michaud, 1987; Michaud and Fourcade, 1989; Cros et al., 1998) provided an accurate lithostratigraphic framework, a detailed paleogeographic reconstruction, and a reasonable interpretation of the sedimentologic evolution of the Chiapas Cretaceous carbonate platform, based on a significant number of measured and correlated stratigraphic sections from the Chiapas Central Depression.

The main aim of this paper is to provide the inventory of all rudist occurrences in the abovementioned area, their location related to an update of both Michaud's (1987) lithostratigraphic framework and paleogeographic reconstruction, the identification of the different rudist assemblages, and the discussion of their age. The detailed systematic description of all the rudist species is in preparation to be subsequently published elsewhere.

2. Materials and methods

A total number of seven hundred rudist specimens were collected from around thirty-six fossil sites. Identification numbers (P-xxxx) were assigned to each fossil site, which may correspond to a single outcrop or to each particular rudist bed within a stratigraphic section. All of them were correlated, as far as possible, directly in the field or on maps. Rudist specimens were sectioned and studied at the Universidad Nacional Autónoma de México (UNAM) and at the Universitat Autònoma de Barcelona (UAB). Ammonites were also collected and studied.

2.1. Stratigraphy

The Chiapas Central Depression (Fig. 1) is mainly formed by a series of gently dipping synclines of Upper Cretaceous rocks, with Tertiary rocks occupying, in some of them, the cores. The Ocozocoautla, Copoya, and Grijalva synclines are staggered and aligned from W to E with a N 55° W trend, approximately parallel to the Pacific coast line. The first two extend around 40 km each and have a periclinal ending. The last one, the largest and with its northern flank faulted, extends nearly 200 km away towards SE from the E of Tuxtla Gutiérrez.

The Upper Cretaceous oldest rocks cropping out correspond to the limestones of the Sierra Madre Formation, and form the base of

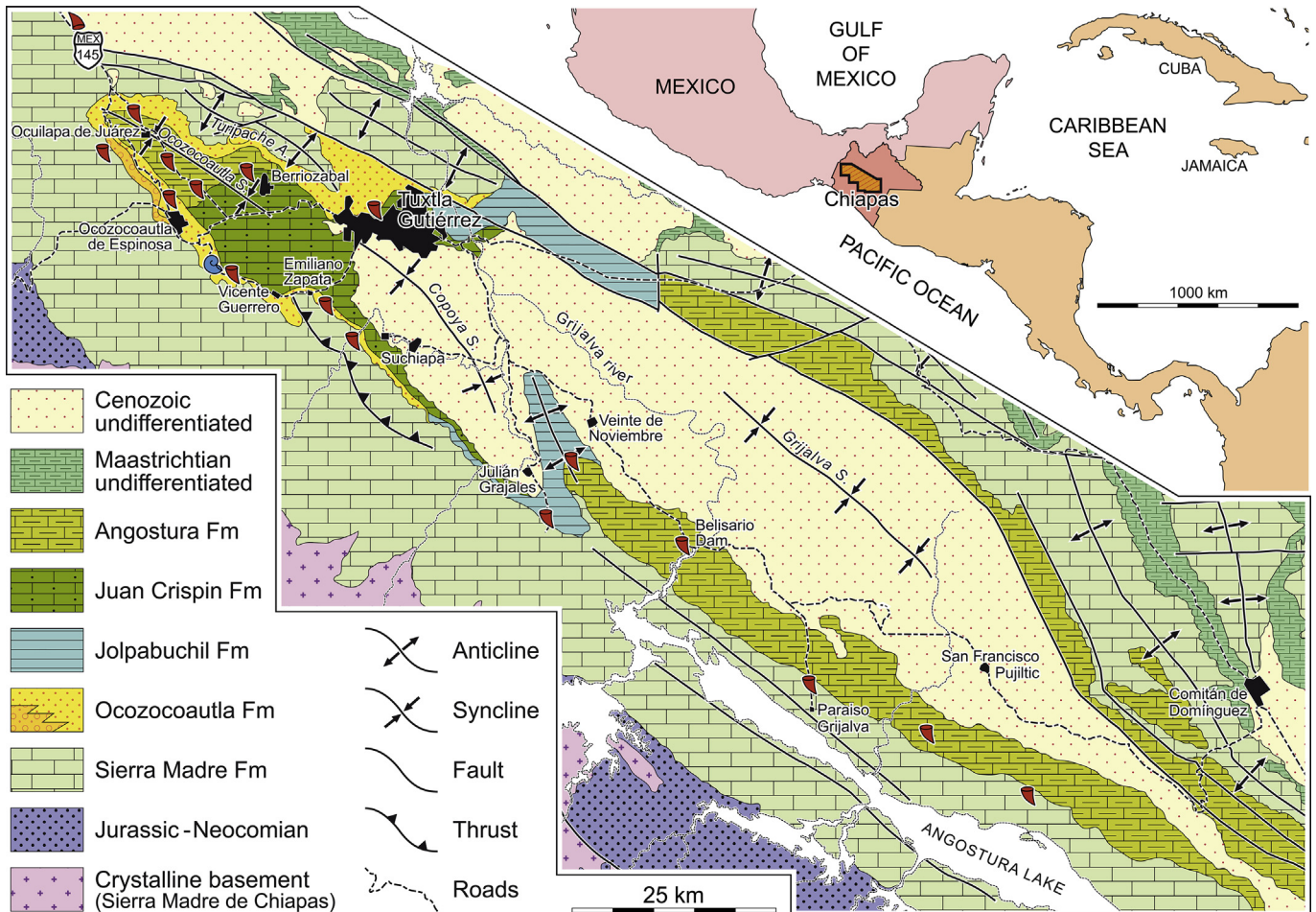


Fig. 1. Schematic geologic map of the Chiapas Central Depression, modified from Servicio Geológico Mexicano (2005). Carta Geológico-Minera 1:250,000. Tuxtla Gutiérrez. S = syncline, A = anticline. Symbols indicate rudist and ammonite localities.

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