Revista Mexicana de Ciencias Geológicas, volumen 12, número 2,
1995, p. 191-194.
Universidad Nacional Autónoma de México, Instituto de Geología,
México, D.F.

TOUCASIA HANCOCKENSIS (HIPPURITACEA-REQUIENIDAE) IN SOUTHWESTERN MEXICO

*Pedro García-Barrera**

ABSTRACT

Toucasia hancockensis Whitney was found in a new locality of early Albian age in southwestern Mexico. This species was first described in the Glen Rose Limestone of Bandera County, Texas, U.S.A.

The fossiliferous strata belong to the sequence described by Pantoja-Alor in 1959 and 1990 as Mal Paso Formation, in the State of Michoacán.

Toucasia hancockensis has not been registered before in the lower Albian rocks of Mexico; it is found in small limestone banks that correspond to lagoonal biostromes of post-reefal facies.

Key words: Hippuritacea, Requienida, *Toucasia hancockensis*, lower Albian, lagoonal facies, Mal Paso Formation, Michoacán, Mexico.

RESUMEN

Toucasia hancockensis Whitney fue encontrada en una nueva localidad de edad albiana temprana en el suroeste de México. Esta especie fue descrita por primera vez en la Caliza Glen Rose, de Bandera County, Texas, E.U.A.

Los estratos fosilíferos pertenecen a la secuencia descrita por Pantoja-Alor en 1959 y 1990 como Formación Mal Paso, en el Estado de Michoacán.

Toucasia hancockensis hasta ahora no había sido registrada en rocas del Albiano inferior de México; se encuentra en pequeños bancos de caliza que corresponden a una facies lagunal post-arrecifal.

Palabras clave: Hippuritacea, Requienida, *Toucasia hancockensis*, Albiano inferior, facies lagunar, Formación Mal Paso, Michoacán, México.

INTRODUCTION

Among rudists, the Requienidae is the least well studied family in Mexico. Most papers on Mexican rudists refer requienid specimens as *Toucasia* sp.

It was decided to improve the study of this fossil group and try to recognize the actual genera and species that occur in the Mexican Cretaceous rocks.

Among the important references on Mexican requienids, and specially on *Toucasia*, there are those of Palmer (1928), Muellerried (1939), and Alencáster and Pantoja-Alor (1986). In this last paper, the authors (Alencáster and Pantoja-Alor, *op. cit.*) wrote about the possible occurrence of Albian *Toucasia hancockensis* at Cerro de Tuxpan in the State of Jalisco. After 1986, no formal papers or reports have considered the genus *Toucasia* in Mexico.

This genus is described from Barremian to Cenomanian strata in Europe, North Africa, and North America. *Toucasia hancockensis* was first described by Whitney (1952) from the Albian age Glen Rose Limestone of Bandera County, Texas.

STUDY AREA

Toucasia hancockensis was found in the Huetamo region, particularly at the locality known as "La Piñuela", about 3 km to the northeast of the "El Apartadero" ranch (Figure 1). The Huetamo region is located near the border of the states of Michoacán and Guerrero in Mexico. The fossiliferous strata of "La Piñuela" locality extend for about 2 km^2.

GEOLOGICAL SETTING

The stratigraphic units of the Mesozoic sequence of the Huetamo region were established by Pantoja-Alor (1959), who subdivided the stratigraphic column as follows:

Angao Formation of Late Jurassic age; San Lucas Formation of Hauterivian-Aptian age; Morelos Formation of Albian age; and Mal Paso Formation of Cenomanian-Turonian age. However, recent, more detailed stratigraphic studies carried out by the same author (Pantoja-Alor, 1990, 1992) resulted in the discovery of new fossil assemblages in the geologic formations and in newly proposed formations.

The new geological configuration of Mesozoic rocks of the east Huetamo region, proposed by the previous author, is as follows:

At the base, the Angao Formation, still considered Upper Jurassic, consists of a distal turbiditic flysch sequence. The Neocomian San Lucas Formation conformably overlies these Jurassic sediments, in the San Lucas anticlinorium. It is a flysch sequence of shale, sandstone and conglomerate turbidites. The San Lucas Formation was divided in two members; the lower one, named Terrero Prieto, consists of shale, calcareous sandstone and conglomerate; at the top of this member, it is possible to observe rudist banks. The upper member, named Las Fraguas, consists of shale, feldspathic calcareous sandstone, siltstone and claystone, with a predominance of volcaniclastic material.

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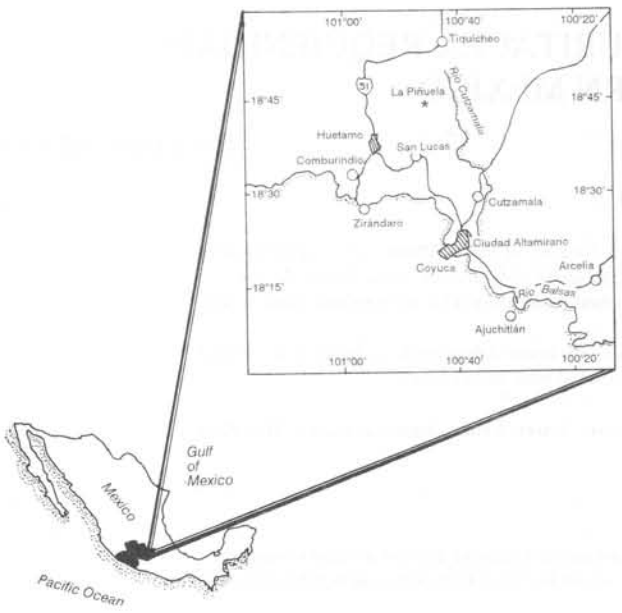

Figure 1. Geographic location of the State of Michoacán and "La Piñuela" locality on the western coast of Mexico.

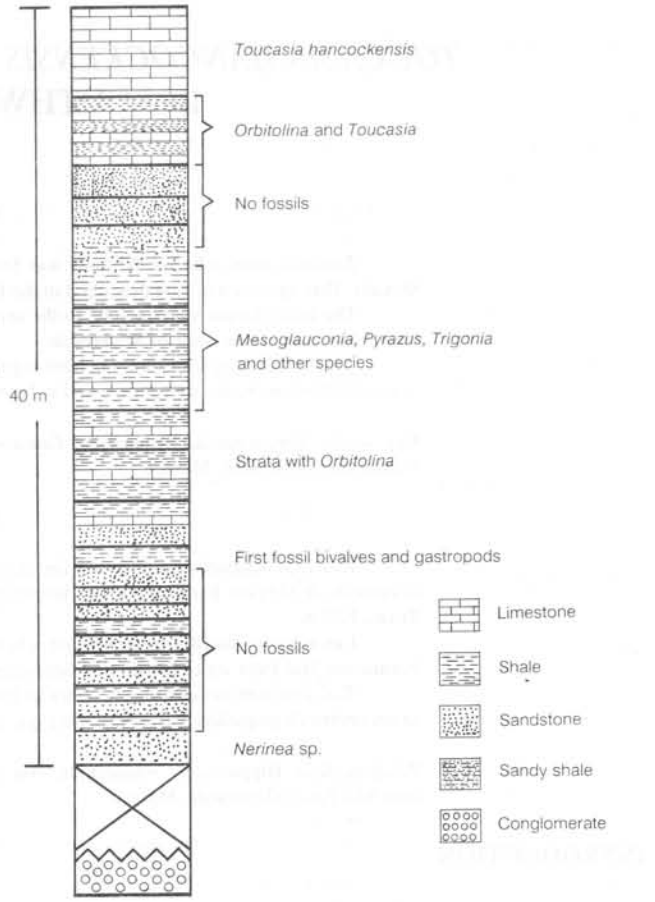

Figure 2. Local stratigraphic sequence of "La Piñuela" locality. The fossilferous strata belong to the upper part of Mal Paso Formation.

Conformably overlying the San Lucas Formation, there are thick strata of limestone with *Orbitolina*. These strata were originally assigned to the Morelos Formation by Pantoja-Alor (1959, p. 16), but they were reassigned to "El Cajón" Formation of Aptian-early Albian age, by the same author (Pantoja-Alor, 1990, p. 66). The sequence of limestone includes argillaceous facies and banks of rudists and ostreids.

The Mal Paso Formation is disconformably overlying the El Cajón Formation. The Mal Paso Formation is almost completely Albian and consists of calcareous and clastic marine sediments with interbedded deltaic sandstone and conglomerate. This formation is also characterized by strong lithologic changes, both vertically and horizontally, due to tectonic instability of the area during the deposition of the sediments. Pantoja-Alor (1992) divided the Mal Paso Formation into two members: a lower clastic member of continental-marine deltaic rocks, and an upper calcareous member that represents an inner lagoonal platform environment. The latter contains almost all the fossil assemblages reported for the Mal Paso Formation, including small banks of *Toucasia hancockensis*.

The strata of the Mal Paso Formation are terminated by an angular unconformity at the base of the Cutzamala Formation of Cenomanian and Turonian ages (Campa-Uranga, 1977). The Cutzamala Formation consists of a thick sequence of red mudstone, sandstone and conglomerate of deltaic origin.

LOCAL STRATIGRAPHY

Stratigraphically, the rocks of La Piñuela locality belong to the Mal Paso Formation and particularly to the upper member of the unit. The local thickness of the strata is about 40 m (Figure 2).

At the base, the local column consists of an alternating series of sandstone—of volcanic origin—and mudstone strata without fossils. In the middle part, there is an alternating sequence of fine mudstone and thin strata of interbedded limestone. This part of the column is fossiliferous and includes strata formed exclusively of *Mesorbitolina* sp. (Figure 3)

The upper part of the column contains fossil gastropods, including species of *Pyrazus, Peruviella, Natica, Mesoglau-*

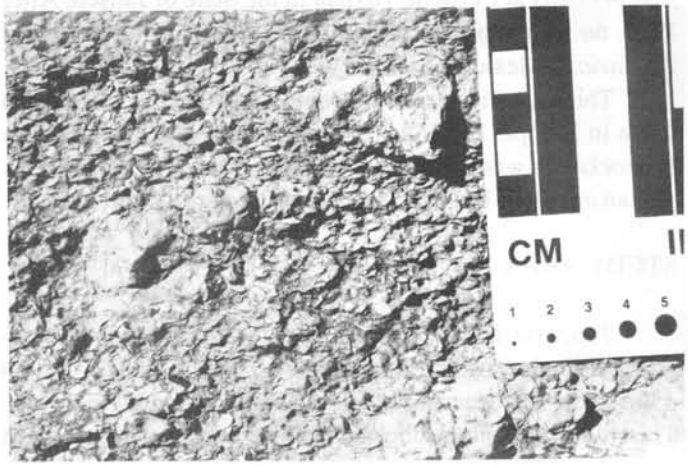

Figure 3. Strata containing exclusively fossil foraminifers of the genus *Mesorbitolina* sp.

conia, Gymnentome, Lunatia, Tylostoma, Paraglauconia and just one specimen of *Pterotrigonia?* (bivalvia). The fossil gastropod assemblage has an early-middle Albian age (Luis Chávez-García, personal communication, 1994).

At the top of the clastic sequence, there are thin strata (6-15 cm) of limestone with *Toucasia hancockensis*. In some places in the area, the top of the stratigraphic sequence is represented by small banks of *Toucasia hancockensis* about 0.80 x 2-3 m, or less.

Toucasia hancockensis Whitney
(Plate 1)

Diagnosis—Almost all the specimens collected have the two valves attached and are very well preserved. The specimens show the following characteristics as compared with the original description of the species after Whitney (1952):

The shell is inequivalve, small to medium in size, 5 to 12 cm long. Beaks twisted and somewhat elevated. Left valve is flattened and concave in the attachment side; rounded, inflated and deeply grooved with two long, curved, narrow grooves on the opposite side. The edge of the shell is sharply carinated. The right valve is smaller than the left one and is not operculiform; it is flattened and concave on the attachment side, rounded and inflated on the opposite side. The edge is carinated and in some specimens it shows a true keel.

The surface of the shell is rough and corrugated, forming curved lines along the shell; this feature is accentuated on the attachment site of the left valve.

Cross sections of several specimens clearly show two layers of the shell, but in some of them three layers can be seen.

Toucasia hancockensis resembles *T. texana,* but there are some notable differences: *T. hancockensis* has the beaks twisted and more elevated, while in *T. texana* they are practically at the same level. The free valve of *T. texana* is operculiform and in *T. hancockensis* it is a keeled valve. In *T. hancockensis* there are two long, curved, narrow grooves that are not present in *T. texana.*

T. hancockensis also resembles *T. patagiata* and *T. pseudopatagiata,* but it differs from them in having less twisted and elevated beaks. In *T. patagiata* and *T. pseudopatagiata* the beaks are so elevated and twisted that they are coiled up over the upper portion of the inferior valve.

Comments—The presence of *Toucasia hancockensis* in southwestern Mexico suggests climatic and ecological homogeneous conditions from Texas in the United States, to the Huetamo region in Mexico, during middle and late Albian. The ecological conditions correspond to Scott's (1990, p. 16) model of what he calls lagoonal biostromes of post-reefal facies. According to Masse, 1976 (*in* Rey, 1983), the coiled shell is less resistant to high hydrodynamic activity and, so, the presence of *Toucasia hancockensis* suggests that the species was subject to a relatively low rate of deposition.

ACKNOWLEDGMENTS

The author wants to thank specially Dr. Gloria Alencáster and M. en C. Jerjes Pantoja-Alor for their accurate comments and fruitful discussions on the systematic, geological and stratigraphical aspects of this paper. He is also indebted to Héctor Hernández for his excellent photographs; to Luis Chávez-García for the orthographic and style corrections of the manuscript; to Francisco Sour and Sara Quiroz of the Museo de Paleontología, Facultad de Ciencias, UNAM, for their great support and professional advice. Field work expenses were supported in part by CONACYT project number D112-903504 in charge of Jerjes Pantoja. Another part was supported by Departamento de Biología, Facultad de Ciencias, UNAM and Dirección General de Asuntos del Personal Académico, UNAM. He wants also to express his gratitude to Dr. A. Coogan for his valuable comments and observations to the manuscript.

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Manuscript received: November 8, 1993.
Corrected manuscript received: April 20,1994
Manuscript accepted: April 28, 1994.

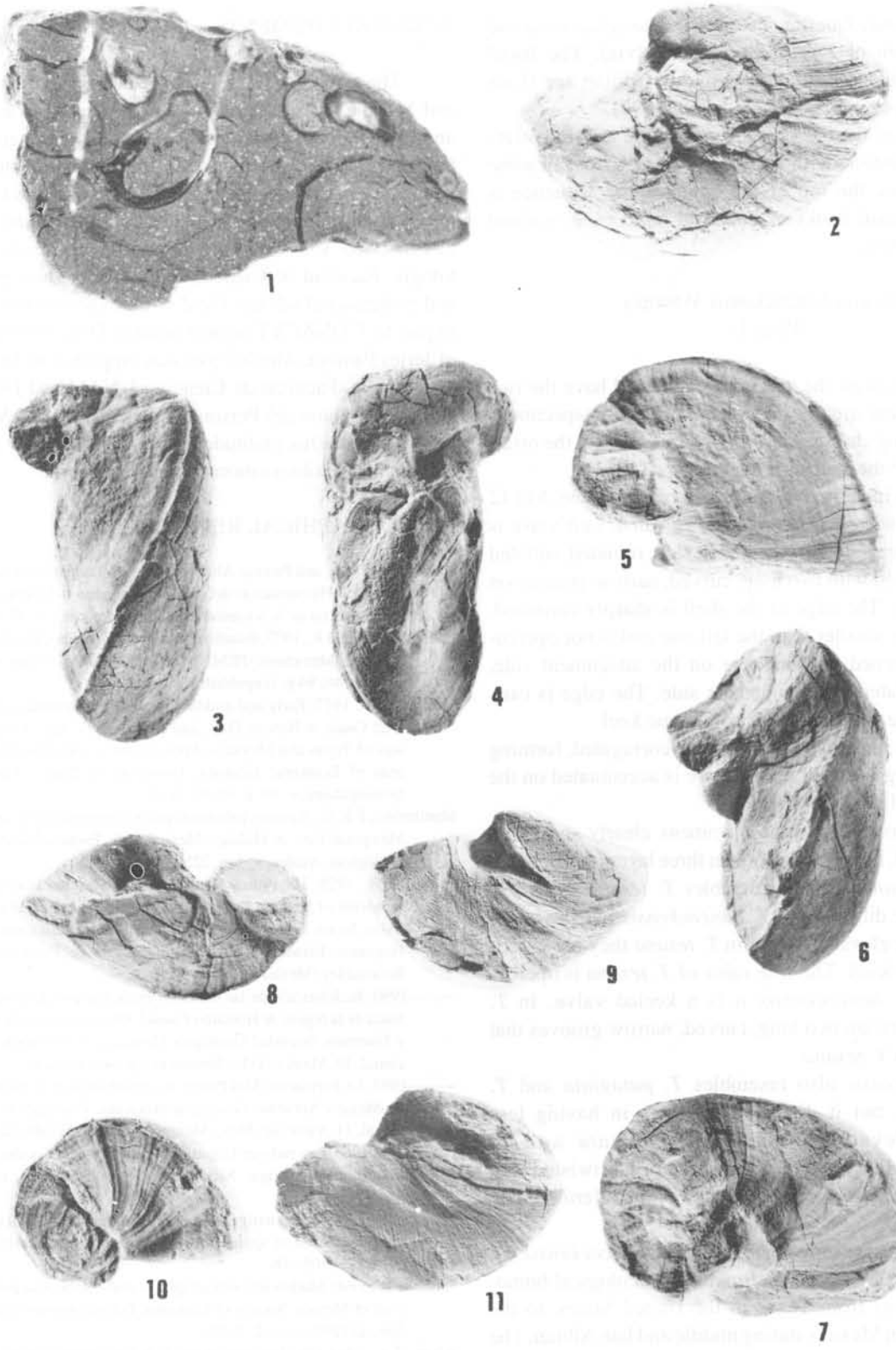

Plate 1. *Toucasia hancockensis* Whitney, 1952. Figure 1—Cross section of three specimens, x 1. Note the three layers of the shell. On the surface, white foraminifers, identified as *Quinqueloculina* sp., are present, as well as specimens that belong to *Mesorbitolina* sp. Specimen Q10-1. Figures 2, 3, 4, 5—Specimen Q10-2, x 1. *2,* Both valves attached; *3,* fixed valve showing the twisted beak; *4,* free valve showing its keel; *5,* anterior view of attached valve. Figures 6, 7—Specimen Q10-3, x 1. *6,* Fixed valve showing somewhat elevated and twisted beak; *7,* lower surface of the attached valve. Figures 8, 9—Specimen Q10-4, x 1. *8,* Small specimen with valves attached and well preserved, except for the truncated beak of the fixed valve; *9,* the specimen shows the upper surface of the attached valve. Figure 10—Specimen Q10-5, x 1. Anterior view of the attached valve showing its corrugated surface. Figure 11—Specimen Q10-6, x 1. Upper surface of both valves. Two long grooves can be seen on the fixed valve.