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The tamuin Member of the Mendez Shale along the Eastern Flank of the Sierra de El Abra, San Luis Potosi, East México.

J. Eduardo Aguayo C. and Kunio Kanamori
Institute for Geosciences
University of Texas at Dallas

RESUMEN

Se propone un nuevo miembro de la Formación Méndez con el nombre de: Miembro Tamuin, el cual se encuentra expuesto a lo largo del flanco Oriental de la Sierra de El Abra, en la región de Tampico, al Este de México.

Litológicamente, el Miembro Tamuin, consiste de calizas argilaceas de color negro, finamente laminadas y con estratificación gradual posiblemente depositadas por corrientes de turbidez.

El Miembro Tamuin es asignable al Campaniano Superior, de acuerdo con su contenido de foraminíferos planctónicos ,y por lo tanto es equivalente a la parte media de la Formación Méndez.

ABSTRACT

The Tamuin Member, is proposed herein as a new member of the Mendez Shale, it is exposed along the eastern flank of the Sierra de El Abra in the Tampico Region in East Mexico.

Lithologically, the Tamuin Member consists of finely laminated, black argilaceous limestone displaying graded bedding, possibly deposited by means of turbidity currents.

The planktonic foraminiferal assemblage in the Tamuin Member indicates that the member is late Campanian in age, thereofre, is equivalent to the middle part of the Mendez Shale.

INTRODUCTION

A field survey was carried out in 1975, in order to examine formational units overlying the El Abra Limestone. As a result of those investigations a new member of the Mendez Shale, the Tamuin Member, was discovered.

DESCRIPTION OF THE TAMUIN MEMBER

Type Locality:
The type locality located north 40 degrees west twelve kilometers from Tamuin at the "Cementos Anahuac" quarry, at foothills of the Sierra de El Abra (Fig. 1).

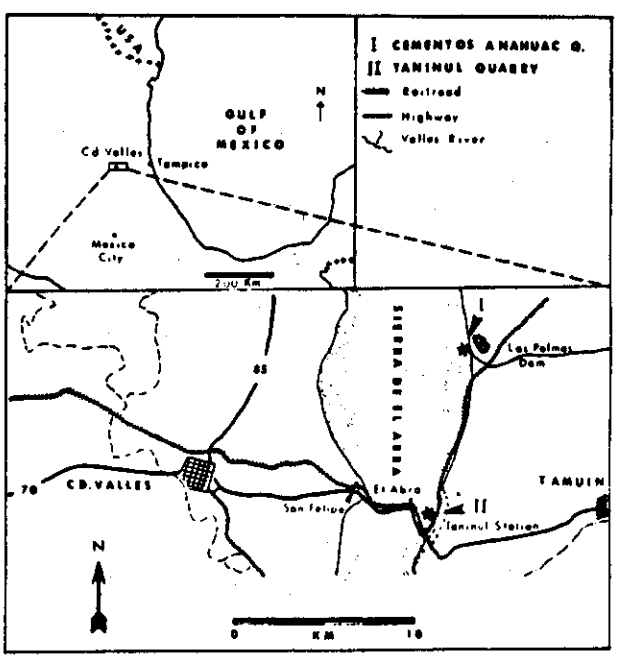

FIG. 1.- LOCALITY MAP SHOWING THE SAMPLING ZONES

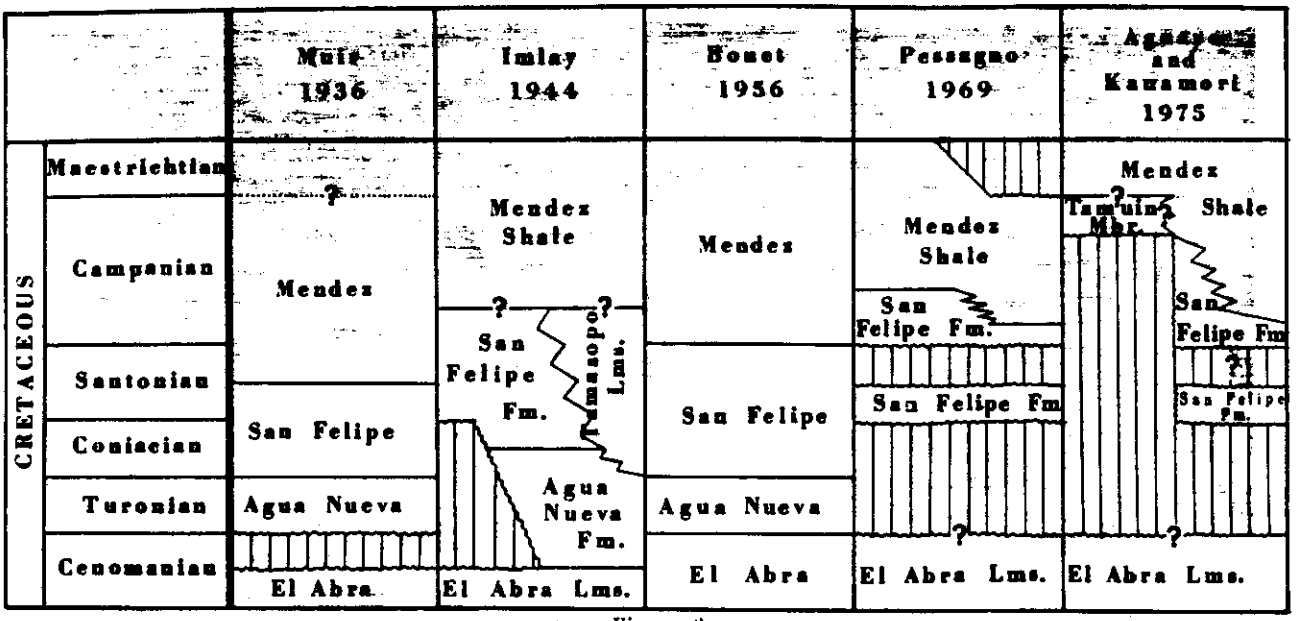

Figure 2
Stratigraphic colum of the easternmost portion of the Valles San Luis Potosi platform in the Tampico Region.

Thickness:

The maximum measured thickness of the Tamuin Member is about 40 meters measured at the type locality.

Lithology:

The Tamuin Member consists of hard, black, finely laminated, pyritic, argillaceous limestone which weathers buff to brown splintery fragments.

Contacts:

The Tamuin Member overlies the El Abra Limestone in angular unconformity and thins to the west. Usually, the upper contact is uncertain due to soil cover or erosion.

At the "Taninul" quarry, the Tamuin Member is in fault contact with the San Felipe Formation (Fig. 3).

Depositional Environment:

Small-scale structures such as tool marks, current lineations, graded bedding, cross-bedding, horizontal lamination, and convolute bedding, suggest a distal turbidite deposit along the eastern flank of the Sierra de El Abra.

Distribution:

The Tamuin Member is exposed at least at two localities one is the type locality at "Cementos Anahuac" quarry, and the other is the "Taninul" quarry about 9 kilometers southward from the type locality. At both localities, the dip of the Tamuin Member is about 40 degrees east (Fig. 3).

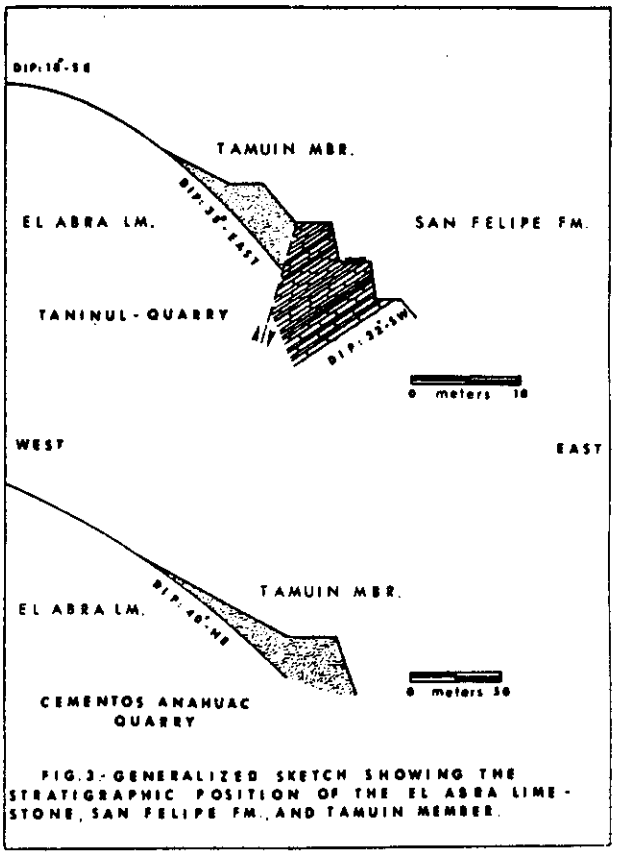

FIG. 3 - GENERALIZED SKETCH SHOWING THE STRATIGRAPHIC POSITION OF THE EL ABRA LIMESTONE, SAN FELIPE FM., AND TAMUIN MEMBER.

Paleontology:

The Tamuin Member includes a rich planktonic foraminiferal fauna and rather scarce benthonic foraminifers. Samples from the Tamuin Member are very indurated thus extraction of individual planktonic foraminifera is limited utilizing existing techniques. Therefore, the following new technique was used for extracting calcareous Foraminifera (See Pessagno, 1976).

1) Crush sample.
2) Place crushed sample in concentrated HF in plastic beaker for 48 hours.
3) Pour off concentrated HF.
4) Wash, and sieve the resulting residue.
5) Place the residue in concentrated HF for five minutes.
6) Pour off concentrated HF, wash, and sieve the residue.
7) Place the residue in ultrasonic cleaner with water for 10 minutes.
8) Sieve the residue again.

Calcareous Foraminifera are replaced by fluorite using this technique. The method is effective in extracting calcareous Foraminifera from hard shale and from argillaceous limestone.

In addition to the examination of matrix-free individuals, some microfossils were also identified in thin sections. The following planktonic foraminiferal assemblage was recognized at each locality of the Tamuin Member.

Locality I: "Cementos Anahuac" quarry:

Pseudotextularia elegans (Rzehak), *Globotruncana arca* (Cushman), *G. bulloides* Vogler, *G. elevata* (Brotzen), *G. fornicata* Plummer, *G. hilli* Pessagno, *G. lapparenti* Brotzen, *G. linneiana* (d'Orbigny), *G. loeblichi* Pessagno, *G. rosetta* (Carsey), *G. stephensoni* Pessagno, *G. stuartiformis* Dabiez *stuartiformis* Dabiez and *G. ventricosa* White.

Locality II, "Taninul" quarry:

Heterohelix globulosa (Ehrenberg), *Pseudoguembelina costulata* (Cushman), *Pseudotextularia elegans* (Rzehak), *Globigerinelloides bollii* Pessagno, *Archaeoglobigerina blowi* Pessagno, *A. cretacea* (d'Orbigny), *Globotruncana arca* (Cushman), *G. bulloides* Vogler, *G. elevata* (Brotzen), *G. fornicata* Plummer, *G. hilli* Pessagno, *G. lapparenti* Brotzen, *G. linneiana* (d'Orbigny), *G.* cf *rosseta* (Carsey), *G. stephensoni* Pessagno, *G. stuartiformis* Dalbiez and *G. ventricosa* White.

These planktonic foraminiferal assemblages are assignable to the *Globotruncana fornicata - stuartiformis Assemblage* Zone, *G. elevata* Subzone, *G. calcarata* Zonule of Pessagno (1967, 1969) and are indicative of a late Campanian age.

DISCUSSION

A controversy exists concerning the disignation of formations overlying the El Abra Limestone along the southeastern flank of the Sierra de El Abra. Kellum (1930) pointed out that the upper part of the Mendez Shale overlies the El Abra Limestone in this area. Muir (1936), however, stated that the middle Mendez red shales were down-thrown on the east againts the El Abra Limestone by a faulted contact at "Taninul" Cave. Several kilometers north of "Las Palmas" dam the contact between the El Abra Limestone and Mendez Shale "seemed to be an overlap" (Ojo de Agua de Ponce).

Bonet (1952) pointed out that the Mendez marls exposed along the escarpment, rests unconformably on the El Abra Limestone, except to the southeast at Taninul Station, where the San Felipe Formation crops out. There he stated that the San Felipe Formation dips to the west in fault contact with the El Abra Limestone. Pessagno (1969) suggested that Campanian Mendez strata are in contact with the El Abra Limestone due to a thrust fault.
The San Felipe Formation differs from the Tamuin Member in that it consists of an alternation of limestone and marl. Although both are similar when weathered.

The Tamuin Member can be distinguished from the Mendez Shale (1) by showing darker color, (2) by being more limy and harder, (3) by being broken into slabs as apposed to subangular fragments and semispheroidal lumps. However, the Tamuin Member corresponds in age with the middle Mendez Shale. Therefore, we include tentatively such member as part of the Mendez Shale herein. The writers have also examined the planktonic foraminiferal assemblage in the San Felipe Formation. The assemblage found is listed below.

Type locality of the San Felipe Formation: the outcrop west of San Felipe at the point 541.37 kilometers on the National Railroad.
Heterohelix globulosa (Ehrenberg), *Pseudotextularia elegans* (Rzehak), *Globotruncana arca* (Cushman),

G. bulloides Vogler, *G. fornicata* Plummer, *G. lapparenti* Brotzen, *G. linneiana* (d'Orbigny), *G. rosetta* (Carsey), *G. stephensoni* Pessagno and *G. stuartiformis* Dalbiez.

This assemblage is correlative with the *Globotruncana fornicata - stuartiformis* Assemblage Zone, *Archaeglobigerina blowi* Subzone *D. multicostata* Zonule of Pessagno (1967, 1969). These assemblages are indicative of an early Campanian age.

The sample from locality II was taken close to the transition zone between the Mendez Shale and the San Felipe Formation, at the "Taninul" quarry. It contained the following planktonic species:

Heterohelix globulosa (Ehrenberg), *H. pulchra* (Brotzen), *H. striata* (Ehrenberg), *H. ultimatumida* (White), *Pseudoguembelina costulata* (Cushman), *Pseudotextularia elegans* (Rzehak), *Globigerinelloides multispina* (Lalicker), *G. prairiehillensis* Pessagno, *Archaeoglobigerina blowi* Pessagno, *A. cretacea* (d'Orbigny), *Globotruncana arca* (Cushman), *G. bulloides* Vogler, *G. elevata* (Brotzen), *G. fornicata* Plummer, *G. lapparenti* Brotzen, *G. linneiana* (d' Orbigny, *G. loeblichi* Pessagno, *G. rosetta* (Carsey), *G. stephensoni* Pessagno, *G. stuartiformis* Dalbiez and *G. ventricosa* White, *Rugoglobigerina rugosa* (Plummer).

This assemblage is asignable to the *G. fornicata - stuartiformis* Zone *G. elevata* Subzone (P. *elegans* Zonule) of Pessagno (1967, 1969) and is thus younger than the sample of the type locality of the San Felipe Formation. These assemblages are indicative of an early to late Campanian age. However, they are still older than the assemblage from the Tamuin Member and below the first occurrence biohorizon of *Globotruncana hilli and* of *Globigerinelloides bollii*

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REFERENCES

BONET, F.

1952 *La Facies Urgoniana del Cretácico Medio de la Región de Tampico.* Bol. Asoc. Mex. Geol. Petrol. IV (5-6): 153-262, 50 figs.

1956 *Zonificación Microfaunistica de las Calizas Cretácicas del Este de México.* Bol. Asoc. Mex. Geol. Petrol. XX Congreso Geológico Internacional, 3 cuadro, 4 figs., láms. XXXI.

1963 *Bostratigraphic Notes on the Cretaceous of Eastern Mexico.* Corpus Christi Geol. Soc. Annual Field Trip Guidebook, pp. 36-48.

BONET, F.; HEIM, A. Y VOLLBRECHTHAUSEN, A. U.

1956 *Map* (fig. 9) *in Estratigrafia del Cenozoico y del Mesozoico a lo Largo de la Carretera Entre Reynosa, Tamps. y México, D. F. Tectónica de la Sierra Madre Oriental Vulcanismo en el Valle de México.* Congreso Geológico Internacional, XX Sesion: 323 pp., 15 figs., tablas IX.

CARRILLO, J.

1971 *La Plataforma Valles - San Luis Potosí.* Bol. Asoc. Mex. Geol. Petrol. XXIII (1-6): 102 pp.

COOGAN, A. H.; BEBOUT, D. G. Y MAGGIO, C.

1972 *Depositional Environments and Geologic History of Golden Lane and Poza Rica Trend, Mexico, an Alternative View.* Am. Assoc. Petroleum Geologists Bull. 56 (8): 1419-1447, 21 figs.

HINOJOSA, A.

MS *Excursión Geológica Tampico, Tam.-Zacatecas, Zac. Etapa No. 2 Tramo: Tamuin-Rio Verde, S. L. P.* Petróleos Mexicanos (1972)

IMLAY, R. W.

1944 *Cretaceous Formations of Central America and Mexico.* Am. Assoc. Petroleum Geologists Bull. 28 (8): 1077-1195, 16 figs.

KELLUM, L. B.

1930 *Similarity of Surface Geology in Front Ranges of Sierra Madre Oriental to Subsurface in Mexican South Fields. Am.* Assoc. Petroleum Geologists Bull. 14 (1): 73-91, 3 figs., table I.

MOYA, F.

1974 *Estudio Estratigráfico y Sedimentológico de los Sedimentos cretácicos Depositados en el Area Pre-arrecifal de la Margen Oriental de la Plataforma Valles - San Luis Potosí.* Asoc. Int. Petróleos Mexicanos, XII Congreso (1974): 14 pp.

MUIR, J. M.

1936 *Geology of the Tampico Region, Mexico.* Am. Assoc. Petroleum Geologists, Tulsa, 280 pp.

PESSAGNO, E. A., JR.
1967 *Upper Cretaceous Planktonic Foraminifera From the Western Gulf Coastal Plain.* Paleontographica Americana 5 (37): 245-445, pls. 48-101, figs. 1-63.

1969 *Upper Cretaceous Stratigraphy of the Western Gulf Coast Area of Mexico, Texas, and Arkansas.* Geol. Soc. Am., Mem. 111: 139 pp., pls. 1-60.

1976 *Upper Jurassic Radiolaria and Radiolarian Biostratigraphy of the California Coast Ranges.* in press.

Plate 1

1. *Photograph showing the contact between the Taninul Member (T) and the El Abra Limestone (A) at the "Cementos Anahuac" quarry. Scale bar-5 meters.*
2. *Same as above. Notice the massive aspect of the Taninul Member. Scale bar-2 meters.*
3. *Close-up of the Taninul Member at the type locality. Notice parallel current lineations oriented north-south. See pen for scale.*

4-5. Pseudotextularia elegans *(Rzehak)*

4: Lateral view. 5: Apertural view. Scale bar-150 microns.

Plate 2

1-3. Globotruncana formicata *Plummer.*

The specimen replaced by fluorite.
1: Spiral view. 2: Side view. 3: Umbilical view. Scale bar-150 microns.

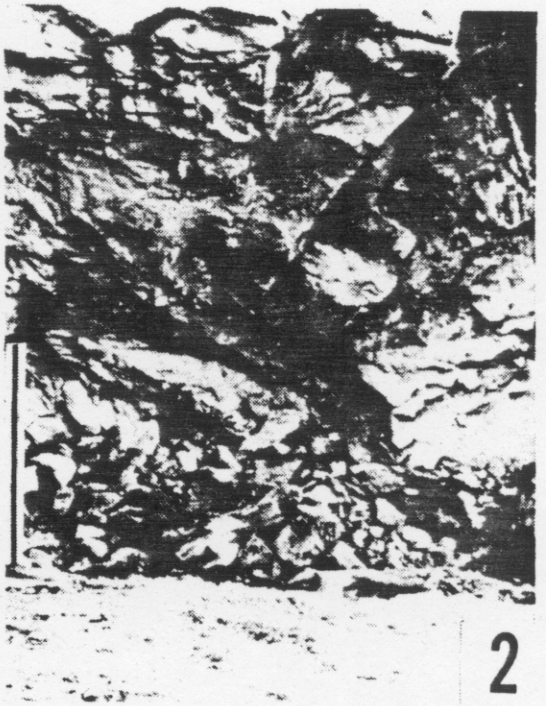
4-6. Globotruncana elevata *(Brotzen)*

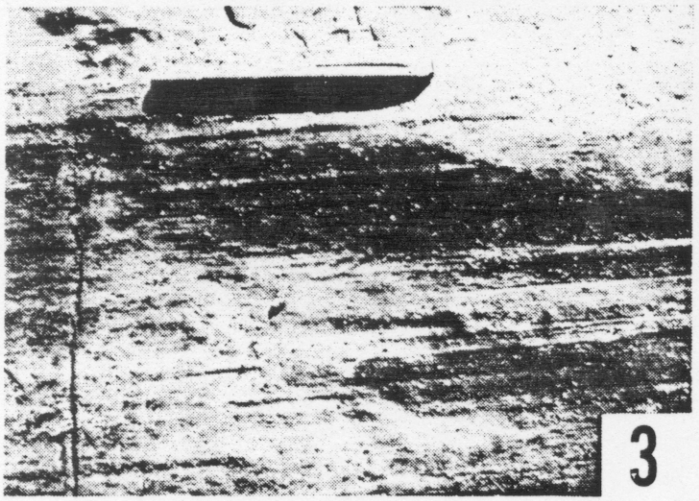
The specimen replaced by fluorite.
4: Spiral view. 5: Side view. 6: Umbilical view. Scale bar-200 microns.

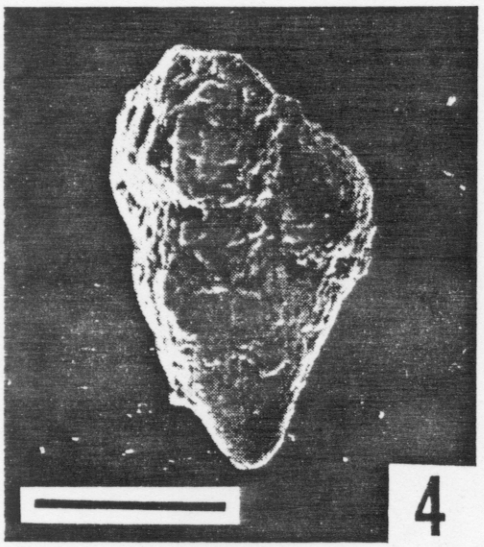
7-2. Globotruncana hilli *Pessagno.*

The specimen replaced by fluorite.
7: Spiral view. 8: Side view. 9: Umbilical view. Scale bar-120 microns.

Plate 1







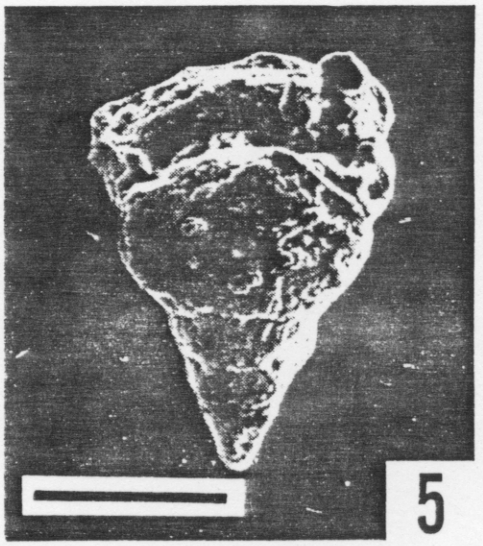


Plate 2