INITIAL REPORT ON THE GEOLOGY OF THE NORTHEASTERN PART OF THE NEW BRAUNFELS, TEXAS 30 X 60 MINUTE QUADRANGLE

by

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Introduction

This brief report describes initial progress on geologic mapping and paleontologic studies that are being conducted in the vicinity of New Braunfels, Texas. The primary objective of this work is to produce an accurate geologic map that will be printed on the new 1:100,000-scale map of the New Braunfels, Texas, 30 X 60 minute quadrangle, which is in preparation by the U.S. Geological Survey. A planimetric version has been printed, but the final topographic map is not yet available. Our initial mapping has been completed on 1:24,000-scale topographic maps and is intended for compilation at 1:100,000-scale.

Partial funding for the second year of the study has been approved. Work during year two will continue the mapping into quadrangles adjacent to those mapped in year one. Paleontologic work by Dr. Will Elder will continue as part of the in-kind contribution by the U. S. Geological Survey to this effort. Dr. E. G. Wermund has described this project to several groups for whom the geology of this area is of interest. Draft copies of the mapping accomplished to date have been given to the Edwards Underground Water District, potentially for entry by them into a GIS, and copies will be made available to other interested parties as requested. In addition, the South Texas Geological Society has passed a resolution commending this initiative, supporting this new mapping effort, and offering the help of their membership.

Geologic Mapping

Draft copies of the geologic mapping we have accomplished on the four 7.5-minute quadrangles that compose the northeastern corner of the New Braunfels sheet are included with this report. These four maps are the Devil's Backbone, Hunter, Sattler, and Wimberley, Texas, quadrangles. An explanation of the fifteen map units shown on the four quadrangles is included as Appendix A. No detailed discussion of the stratigraphic or structural relationships is presented at this early stage of the project.

The mapping was accomplished by field work, compilation of previous work, interpretation of black and white aerial photographs, and by use of photogrammetric techniques at the U.S. Geological Survey offices in Denver, Colorado. Use of the photogrammetry equipment was made possible by an in-kind contribution from the U.S. Geological Survey. Photo interpretations and modifications of previous work, mostly graduate student theses and dissertations, were verified by field work. Access to some areas is prohibited due to extensive private property holdings in the map area. However, publicly maintained roads provide generally good access to most critical contacts.

Previous geologic mapping in the New Braunfels area is shown on Figure 1 and Table 1. These previous maps are at scales between 1:20,000 and 1:250,000, and the subdivision of geologic units varies from one author to another. Some of these maps, such as those by Abbott (1966, 1973; see Fig. 1), have proven to be generally reliable while others have been found to be of variable quality. Many maps are plotted on planimetric bases that are quite inaccurate. There is also commonly a lack of consistency in the placement of contacts in areas where maps overlap or abut.

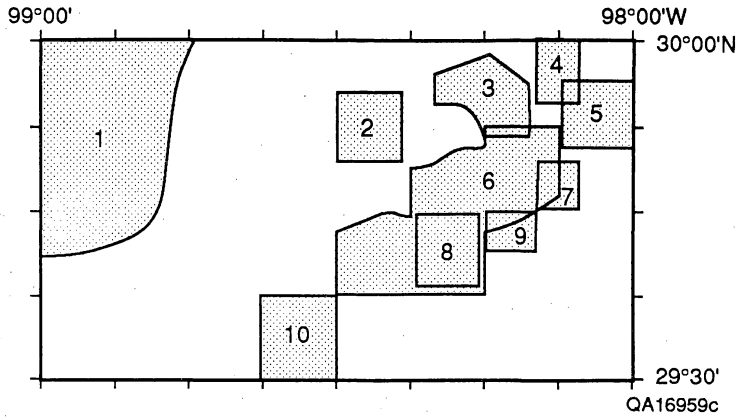


Figure 1. Location of existing geologic maps of the New Braunfels 30 x 60 minute quadrangle.

1. Rose, P. R., 1972, Geologic map of Eastern Edwards Plateau, Texas, in Edwards Group, surface and subsurface, central Texas: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations No. 74, scale 1:250,000.

2. Cooper, J. D., 1964, Geology of Spring Branch area, Comal and Kendall Counties, Texas in Geology of Spring Branch area, Comal and Kendall Counties, Texas: The University of Texas at Austin Master's thesis, scale 1:33,600.

3. Abbott, P. L., 1966, Geology of Canyon Dam area, Comal County, Texas, in Geology of Canyon Dam area, Comal County, Texas: The University of Texas at Austin Master's thesis, scale 1:48,000.

4. Grimshaw, T. W., 1969, Geologic map and cross sections of the Wimberley area, Hays and Comal Counties, Texas, in Geology of Wimberley area, Hays and Comal Counties, Texas: The University of Texas at Austin Master's thesis, scale 1:24,000.

5. Noyes, A. P., Jr., 1957, Geologic map of Purgatory Creek area, Hays and Comal Counties, Texas, in Geology of Purgatory Creek area, Hays and Comal Counties, Texas: The University of Texas at Austin Master's thesis, scale 1:27,000.

6. Abbott, P. L., 1973, Geologic maps of Sattler, upper New Braunfels, Bulverde, Bat Cave, and part of Smithson Valley quadrangles, in The Edwards Limestone in the Balcones fault zone, south-central Texas: The University of Texas at Austin Ph.D. dissertation, scale 1:42,000.

7. Bills, T. V., Jr., 1957, Geology of Waco Springs quadrangle, Comal County, Texas, in Geology of Waco Springs quadrangle, Comal County, Texas: The University of Texas at Austin Master's thesis, scale 1:21,000.

8. Newcomb, J. H., 1970, Geologic map and cross sections of the Bat Cave quadrangle, Comal and Bexar Counties, Texas, in Geology of Bat Cave quadrangle, Comal and Bexar Counties, Texas: The University of Texas at Austin Master's thesis, scale 1:24,000.

9. King, V. L., Jr., 1957, Geologic map of the Mission Valley quadrangle Comal County, Texas, in Geology of the Mission Valley quadrangle, Comal County, Texas: The University of Texas at Austin Master's thesis, scale 1:26,600.

10. Shaw, S. L., 1974, Geologic map of the Castle Hills quadrangle, Bexar County, Texas, in Geology and landuse capability of the Castle Hills quadrangle, Bexar County, Texas: The University of Texas at Austin Master's thesis, scale 1:24,000.

Table 1. List of regional maps that include all or part of the New Braunfels, Texas, 30 x 60 minute quadrangle.

Arnow, Ted, 1959, Geologic map of Bexar County, Texas, in Ground-water geology of Bexar County, Texas: Texas Board of Water Engineers Bulletin 5911, scale 1 inch equals 2 miles.

Brown, T. E., Waechter, N. B., Rose, P. R., and Barnes, V. E., 1974, San Antonio Sheet: The University of Texas at Austin, Bureau of Economic Geology, Geologic Atlas of Texas, scale 1:250,000, revised 1983.

DeCook, K. J., 1963, Geologic map showing location of wells and springs, Hays County, Texas, in Geology and ground-water resources of Hays County, Texas: U.S. Geological Survey Water-Supply Paper 1612, scale 1:125,000.

George, W. O., 1952, Geologic map and section of Comal County, Texas, showing location of recorded wells and springs, in Geology and ground-water resources of Comal County, Texas: U.S. Geological Survey Water-Supply Paper 1138, scale 1:96,000.

Liddle, R. A., 1918, Geologic map of Medina County, Texas, in The Geology and mineral resources of Medina County, Texas: University of Texas Bulletin No. 1860, scale 1 inch equals 3 miles.

Sayre, A. N., 1936, Geologic and hydrologic map of Uvalde and Medina Counties, Texas, in Geology and ground-water resources of Uvalde and Medina Counties, Texas: U.S. Geological Survey Water-Supply Paper 678, scale 1 inch equals 2.75 miles.

Sellards, E. H., 1919, Geologic map of Bexar County, Texas, in The Geology and Mineral Resources of Bexar County: University of Texas Bulletin No. 1932, scale 1 inch equals 3 miles.

Whitney, F. L., 1957, Geologic maps of Bracken, Hunter, New Braunfels, and Smithson Valley quadrangles: The University of Texas at Austin, Bureau of Economic Geology, Miscellaneous Maps, scale 1 inch equals 1 mile, edited by K. P. Young.

Paleontologic Studies

Dr. Will Elder, Branch of Paleontology and Stratigraphy, began a study of the Cretaceous macrofossils of the New Braunfels area as part of the U.S. Geological Survey's in-kind contribution to this project. His summary of this work is included as Appendix B.

Appendix A

Explanation of Geologic Units

Devil's Backbone, Hunter, Sattler, and Wimberley Quadrangles

(1:24,000-scale)

Explanation of Geologic Units

Devil's Backbone, Hunter, Sattler, and Wimberley Quadrangles

(1:24,000-scale)

Quaternary Units

Alluvium (**Qal**). Unconsolidated gravel, sand, silt, and clay along streams and rivers; relatively free of woody vegetation, inundated regularly. Clasts are mainly carbonate and chert.

Quaternary terrace deposits (**Qt**). Unconsolidated gravel, sand, silt, and clay along streams and rivers. These deposits are mostly above flood level along entrenched streams. Upper surface commonly slopes gently downvalley and toward the stream. Along Blanco River Qt may be as thick as 15 feet locally. Along Guadalupe River Qt may be as thick as 20 feet locally.

Quaternary deposits undivided (**Qu**). Unconsolidated gravel, sand, silt, and clay not associated with a stream or river. Includes slope wash, alluvium, colluvium, and locally older Quaternary deposits. Up to 15 feet thick.

Leona Formation (**Qle**). Fine calcareous silt grading down into coarse gravel. Up to 60 feet thick (in wells).

Cretaceous Units

Taylor Group (**Kta**). Clay, marl, and limestone. Clay is gray to yellowish brown, poorly indurated, calcareous. Group includes undifferentiated Pecan Gap Formation marl and limestone. Weathers to thick, black soil, which is commonly farmed. Outcrops rare. Thickness 50 feet.

Austin Group (**Kau**). Chalk, marl, and limestone. Light gray to white, thin to thick bedded, massive to slightly nodular. Chalk mostly microgranular calcite with minor foraminifera tests; abundant Inoceramus prisms. Chalk forms ledges and alternates with marl and locally bentonitic seams. Sparsely glauconitic, pyrite nodules in part weathered to limonite are common. Thick caliche on most outcrops. Thick black soil with juniper and live oak in low-relief areas. Locally highly fossiliferous with pelecypods, echinoids, ostracods, and forams. Thickness 350 to 580 feet.

Eagle Ford Formation (**Kef**). Shale, siltstone, and limestone. Upper part limestone and shale. Shale dark gray. Limestone light yellowish brown, flaggy, in beds up to 4 feet thick. Lower part siltstone and very fine-grained sandstone, light yellow to gray, laminated, flaggy, some limestone, silty, medium brown, laminated. Outcrop is flat to gently rolling. Covered with dark brown soil on slopes. Slope break at Eagle Ford/Buda contact commonly fossiliferous with oysters, ostracods, forams, fish bones and teeth, and Inoceramus. Thickness 30 to 75 feet.

Buda Limestone (**Kbu**). Limestone. Hard and dense to chalky, poorly bedded to nodular, glauconitic, fossiliferous, abundant broken shell fragments locally. Light gray to pale orange; weathers dark gray to brown. Thinner bedded and argillaceous near upper contact. Lower part is soft, punky chalky limestone. Upper contact is disconformable, sharp and conspicuous. Forms resistant cap on hills. Weathers to form thin, red-brown soil with rounded cobbles of limestone. Less glauconitic and less iron oxide-stained than Georgetown Formation. More fossil gastropods than Austin Group. Burrows filled with chalky marl. Abundant pelecypods, forams, ostracods, serpulids, echinoid spines, bryozoans. Locally, solitary corals and green algae. Thickness 60 to 100 feet.

Del Rio Formation (**Kdr**). Clay. Pyritic, gypsiferous, calcareous, poorly indurated, plastic, dark gray to olive brown; abundant Exogyra arietina. Becomes less calcareous and more gypsiferous upward; blocky, medium gray, weathers light gray to yellowish gray. Some thin lenticular beds of highly calcareous siltstone. Slope forming or underhanging where slumped below overlying Buda. Forms highly expansive soil. Water tanks for livestock commonly excavated on outcrop. Upper and lower contacts gradational. Marine megafossils include abundant Exogyra arietina and other pelecypods. Thickness 60 to 120 feet.

Georgetown Formation (**Kgt**). Limestone and some marl. Nodular to bedded, gray to tan, abundant fossils include Kingena wacoensis and Gryphaea washitaensis. Few interbeds of marl 2 to 3 inches thick. Upper contact is conformable and gradational where exposed, commonly obscured by slumping of the overlying Del Rio Formation. Lower contact is disconformable. Diverse assemblage of fossils includes ammonoids, forams, echinoids, and pelecypods. Up to 25 feet thick, locally absent.

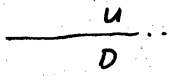
Person Formation (**Kp**). The Person Formation is the upper unit of the Edwards Group. Limestone and dolomite. Honeycombed limestone interbedded with chalky to marly limestone and recrystallized limestone, bedded to massive, leached and collapsed intervals. Locally pockets of red clay (terra rosa) in karst collapse features. Thin, dark red soil and residual chert regolith covered with sparse vegetation. Lower 20 to 30 feet comprise regional dense member, a dense argillaceous limestone; commonly thin, flaggy beds. Mappable bench (regional dense member) at contact with underlying Kainer Formation. Mud cracks preserved near lower contact. Upper contact is burrowed, disconformable. Fossils include pelecypods, gastropods, rudistids. Thickness about 130 to 150 feet thick.

Kainer Formation (**Kk**). The Kainer Formation is the lower unit of the Edwards Group. Limestone and dolomite. Upper part is hard grainstone interbedded with marly mudstone and wackestone, honeycombed; middle part contains leached evaporitic rocks and breccias; hard, dense nodular limestone at base. Residual chert mantles uplands underlain by Kainer. Horizontal current laminations or low-angle cross stratification present. Lower part is locally clayey coarsely crystalline limestone. Fossiliferous: rudistids, caprinids, miliolids, oysters, gastropods. Thickness about 250 feet.

Walnut Formation (**Kw**). Limestone, marl, and dolomite; undifferentiated Bull Creek and Bee Cave Members, upper Bee Cave Member consists of fossiliferous marl, Exogyra texana common; Bee Cave Member thins and pinches out toward the southwest; along steep slopes the marly Bee Cave Member commonly supports denser vegetation than the overlying Kainer Formation; lower Bull Creek Member comprises limestone and dolomite interbedded with some marl; gastropods common; gradational contact with underlying Glen Rose Formation. Cream to light yellowish brown. Karst locally. Formation up to 30 to 40 feet thick.

Glen Rose Formation (**Kgru** and **Kgrl**). Resistant Corbula bed divides the formation into upper and lower parts. **C** indicates locality of Corbula bed outcrop. Limestone, dolomite, and marl. Alternating resistant and recessive beds forming stairstep topography; limestone, aphanitic to fine grained, hard to soft and marly, light gray to yellowish gray; dolomite, fine grained, porous, yellowish brown; burrowed and honeycombed locally; marine megafossils include molluscan steinkerns, rudistids, oysters, and echinoids. Upper part, Kgru, relatively thinner bedded, locally cross-bedded; more dolomitic, and less fossiliferous; thickness about 400 feet. Lower part, Kgrl, more massive, contains some rudistid reefs and oysters. Corbula bed at top with abundant steinkerns of Corbula harveyi (Hill) in an interval up to 5 feet thick; thickness about 500 feet. Thickness of entire formation 900 feet.

Map Symbols



Fault; **U**, upthrown side; **D**, downthrown side; dashed where inferred, dotted where covered.

Karst-related collapse or subsidence of bedrock.

Appendix B

Dr. Will Elder

Initial Report on Macrofossils

of New Braunfels, Texas, Area

United States Department of the Interior

GEOLOGICAL SURVEY

TAKE PRIDE IN AMERICA

MEMORANDUM

To: Jay Raney, Principal Investigator, New Braunfels COGEOMAP Project

From: Will Elder

Through: John Pojeta, Chief, Branch of Paleontology and Stratigraphy 6/12/91

Subject: Paleontological analysis of macrofossils collected on September, 1990 visit

Date: June 10, 1991

Enclosed is a report of macrofossil identifications from the samples that were collected during my visit to the New Braunfels area last September. Sorry to have taken so long in getting these to you but obtaining the proper reference papers and making the identifications on mostly internal molds took longer than I had anticipated.

The following paragraphs summarize and point out some significant observations drawn from the paleontologic analysis.

Analysis of the samples collected near Selma (M8688-M8689) verify my original feelings that they lie in the Austin group rather than in the Pecan Gap Chalk as mapped on the San Antonio 1:250,000 sheet. More specifically, the fossils are indicative of the lower part of the Dessau formation (late Santonian age). Many of the species have their type locality at the "falls of the Guadalupe River" near New Braunfels.

All other samples were collected to the west of the New Braunfels map area and are indicative of either the Anacacho Limestone or the Pecan Gap Chalk (early late Campanian age), with the exception of M8701 which contains inoceramid bivalves indicative of the Austin group.

The best collections from the Anacacho Limestone came from a measured section at King's Water Hole on Hondo Creek (M8692-M8699), a locality where previous workers also have made extensive collections. I plan to inspect and compare any of these collections housed at Austin on future visits. A second locality with a diverse but somewhat different fauna also indicative of the Anacacho Limestone was found west of Rio Medina (M8700). Further investigation for outcrops between this locality and locality M8702, the transition interval between the Anacacho Limestone and the Pecan Gap Chalk, will be carried out on future visits.

A collection at the base of the Anacacho section exposed on Seco Creek north of D'Hanis (M8690) was made in a calcarenite interval that previously has been questionably placed in either the Austin group or the Anacacho Limestone. This sample continued to yield an ambiguous fauna, but one containing taxa somewhat different than typical of the Austin group, suggesting that the calcarenites may lie in the Anacacho Limestone.

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

REPORT ON REFERRED FOSSILS

Stratigraphic Range Late Cretaceous, Santonian-Campanian	**Shipment Number** CGM-91-1M
General Locality (state,country,ocean,etc.) Texas	**Number of Samples** 15
Quadrangle or Area San Antonio 1:250,000 Quadrangle	**Region** (county,province,sea,etc.) Guadalupe, Medina, Bexar
Fossil Type(s) Mollusks, Echinoids	**Referred By** Jay Raney
Formation Austin group, Anacacho Limestone, Pecan Gap Chalk	**Report By** William P. Elder
Latitude deg. min. 29°	**Longitude** deg. min. 99°	**Report Date** June 4, 1991

USGS Mesozoic Locality: M8688.
Guadalupe County, Texas, San Antonio 1:250,000 Quadrangle.
Marly LS in low cut 0.1 mi S of I-35 on rd. 1 mi E of Cibolo Ck.
Latitude: 29° 35.50' N; Longitude: 98° 17.55' W;
Collector: W. P. Elder, 1990; Field Identifier: 90ET-1.
Stratigraphic unit: Dessau formation

TAXA PRESENT

AMMONITES

Psuedoschloenbachia mexicana (Renz)
Baculites cf. *B. aquilaensis* Reeside
Glyptoxoceras? sp.

BIVALVES

Inoceramus (Cordiceramus) mülleri Petrascheck
Inoceramus (Cordiceramus) cordiformis Sowerby
Spondylus guadalupae Römer
Phrygia aucella (Römer)
Camptonectes bensoni (Kniker)
Syncyclonema? sp.
Phelopteria? sp.
Phelopteria? planiscala (Römer)
Lima crenulicosta? (Römer)
Liopistha elegantula? (Römer)
Astarte lineolata Römer
Tenea? sp.
Cardiid

Cucullaeid
Rudistid?

GASTROPODS
Paladmete? sp.
Pugnellus? sp.

ECHINOID
Hemiaster texanus? Römer

Remarks: *Psuedoschloenbachia mexicana* (Renz) is indicative of the lower part of the latest Santonian Dessau formation of the Austin group. The other components of the assemblage, particularly the inoceramid bivalves *Inoceramus (Cordiceramus) mülleri* Petrascheck and *Inoceramus (Cordiceramus) cordiformis* Sowerby, are consistent with this age assignment.

USGS Mesozoic Locality: M8689.
Guadalupe County, Texas, San Antonio 1:250,000 quadrangle.
Marly LS in low cut 1.35 mi S of I-35 on rd. 1 mi E of Cibolo Ck.
Latitude: 29° 35.00' N; Longitude: 98° 17.40' W;
Collector: W. P. Elder, 1990; Field Identifier: 90ET-2.
Stratigraphic unit: Dessau formation

TAXA PRESENT

AMMONITES
Bevahites bevahensis? Collignon
Baculites sp.

BIVALVES
Inoceramus (Cordiceramus) mülleri Petrascheck
Inoceramus (Cordiceramus) cordiformis Sowerby
Spondylus guadalupae Römer
Lopha travisana (Stephenson)
Phrygia aucella (Römer)
Camptonectes bensoni (Kniker)
Neithea sp.
Phelopteria? planiscala (Römer)

Liopistha elegantula? (Römer)
Astarte lineolata Römer
Cardiid
Cucullaeid

GASTROPODS
Anchura sp.

ECHINOID
Hemiaster texanus? Römer

Remarks: The questioned juvenile *Bevahites bevahensis* Collignon found in this sample is indicative of the latest Santonian Dessau formation of the Austin group. The other components of the assemblage, particularly the inoceramid bivalves *Inoceramus (Cordiceramus) mülleri* Petrascheck and *Inoceramus (Cordiceramus) cordiformis* Sowerby are consistent with this age assignment.

USGS Mesozoic Locality: M8690.
Medina County, Texas, San Antonio 1:250,000 quadrangle.
Marl interbed in calcarenitic LS in Seco Ck on Rd 1796 ca. 2 mi N of D'Hanis.
Latitude: 29° 21.70' N; Longitude: 99° 17.00' W;
Collector: W. P. Elder, 1990; Field Identifier: 90ET-3A.
Stratigraphic unit: Anacacho Limestone?

TAXA PRESENT

BIVALVES
Spondylus n. sp.?
Exogyra sp.
Pycnodonte aff. *P. mutabilis* (Morton)
Lyriochlamys? sp.

ECHINOID
Phyllobrissus cubensis (Weisbord)

Remarks: Brown (1965) questioned whether the calcarentitic interval from which these fossils were collected belonged to the Austin group or the Anacacho Limestone. None of the fossils present are restricted to the Anacacho, but *Pycnodonte mutabilis* (Morton) is only

questionably known from the Austin and is typically found in younger rocks. In addition, the *Spondylus* sp. found here appears to be different than *Spondylus guadalupae* Römer, which is typical of the Austin chalk. These data suggest that this sample lies in the Anacacho Limestone.

USGS Mesozoic Locality: M8691.
Medina County, Texas, San Antonio 1:250,000 quadrangle.
Marls overlying LS in Seco Ck on Rd 1796 ca. 2 mi N of D'Hanis.
Latitude: 29° 21.70' N; Longitude: 99° 17.00' W;
Collector: W. P. Elder, 1990; Field Identifier: 90ET-3B.
Stratigraphic unit: Anacacho Limestone

TAXA PRESENT

AMMONITE
Baculites sp.

BIVALVES
Panopea n. sp.
Cardiid

GASTROPOD
Haustator trilira (Conrad)

Remarks: *Haustator trilira* (Conrad) is characteristic of the Taylor marl in Texas, which is consistent with this sample lying in the Anacacho Limestone.

USGS Mesozoic Locality: M8692 to M8699.
Medina County, Texas, San Antonio 1:250,000 quadrangle.
Anacacho Limestone at King's Water Hole. Hondo Ck crossing 3 mi N of Hondo.
Latitude: 29° 23.50' N; Longitude: 99° 9.15' W;
Collector: W. P. Elder, 1990; Field Identifier: 90ET-4.
Stratigraphic unit: Anacacho Limestone

See attached column for stratigraphic positions of sampled units at localities M8692 to M8699.

Unit 2; USGS Mesozoic Locality: M8692.

TAXA PRESENT

BIVALVE

Granocardium (Ethmocardium) cf. *G. (E.) conradi* (Stephenson)

Unit 3; USGS Mesozoic Locality: M8693.

TAXA PRESENT

AMMONITE

Baculites taylorensis Adkins

BIVALVES

Pycnodonte mutabilis (Morton)
Protocardia (Pachycardium) cf. *P. (P.) spillmani* (Conrad)
Neithea cf. *N. hartmani* Kniker
Cymella bella (Conrad)
Nuculana? sp.
Leptosolen cf. *L. biplicata* (Conrad)
Lima reticulata Forbes
Idonearca sp.
Panopea n. sp.
Inoceramid
Trigoniid

OTHER

Nautiloid?
Scaphopod

Remarks: This assemblage is typical of rocks the age of the Taylor marl.

Unit 4; USGS Mesozoic Locality: M8694.

TAXA PRESENT

AMMONITE
Trachyscaphites spiniger (Schlüter)

BIVALVES
Neithea cf. *N. hartmani* Kniker
Lima reticulata Forbes
Pycnodonte mutabilis (Morton)
Syncyclonema? n. sp.
Nemodon? sp.

GASTROPODS
Pyropsis aff. *P. perlata* Conrad
Euthriofusus? aff. *convexus* (Wade)
Naticid

Remarks: *Trachyscaphites spiniger* (Schlüter) is characteristic of the Anacacho Limestone and the Pecan Gap Chalk in Texas.

Unit 5; USGS Mesozoic Locality: M8695.

TAXA PRESENT

BIVALVE
Granocardium (Ethmocardium) cf. *G. (E.) conradi* (Stephenson)

Unit 6; USGS Mesozoic Locality: M8696.

TAXA PRESENT

AMMONITES
Baculites sp.
Pachydiscus cf. *P. gollevillensis* (D'Orbigny)
Bostrychoceras polyplocum (Römer)

BIVALVES

Exogyra ponderosa erraticostata Stephenson
Protocardia (Pachycardium) cf. *P. (P.) spillmani* (Conrad)
Idonearca sp.
Panopea n. sp.
Pinna cf. *P. laqueata* Conrad
Endocostea cf. *E. baltica* (Böhm)
Lucina? sp.
Trigoniid

GASTROPODS

Pyropsis aff. *P. perlata* Conrad
Gyrodes sp.

Remarks: These taxa are characteristic of the early late Campanian Anacacho Limestone.

Unit 8; USGS Mesozoic Locality: M8697.

TAXA PRESENT

AMMONITES

Baculites sp.
Bostrychoceras polyplocum (Römer)
Trachyscaphites spiniger (Schlüter)

BIVALVES

Exogyra ponderosa erraticostata Stephenson
Exogyra spinosa Stephenson
Protocardia (Pachycardium) cf. *P. (P.) spillmani* (Conrad)
Idonearca sp.
Pinna cf. *P. laqueata* Conrad
Endocostea cf. *E. baltica* (Böhm)
Lima reticulata Forbes
Pycnodonte mutabilis (Morton)
Neithea cf. *N. hartmani* Kniker
Trigonarca? sp.
Syncyclonema? sp.
Spondylus sp.

Barbatia? sp.
Rudistid
Trigoniid

GASTROPODS
Ecophora aff. *E. proquadricostata?* Wade

Remarks: These taxa are characteristic of the early late Campanian Anacacho Limestone.

Unit 9; USGS Mesozoic Locality: M8698.

TAXA PRESENT

BIVALVES
Lima reticulata Forbes
Pycnodonte mutabilis (Morton)
Camptonectes cf. *C. bellisculptus* (Conrad)

Unit 14; USGS Mesozoic Locality: M8699.

TAXA PRESENT

BIVALVES
Pycnodonte mutabilis (Morton)
Idonearca sp.
Protocardia (Pachycardium) cf. *P. (P.) spillmani* (Conrad)

ECHINOID
Irregular echinoid

USGS Mesozoic Locality: M8700.
Medina County, Texas, San Antonio 1:250,000 quadrangle.
Rd 1957 2 mi E of Rio Medina in cut on hill.
Latitude: 29° 25.90' N; Longitude: 98° 51.35' W;
Collector: W. P. Elder, 1990; Field Identifier: 90ET-5.
Stratigraphic unit: Anacacho Limestone

TAXA PRESENT

AMMONITE

Baculites taylorensis Adkins

BIVALVES

Pycnodonte sp.
Protocardia (Pachycardium) cf. *P. (P.) spillmani* (Conrad)
Neithea cf. *N. hartmani* Kniker
Idonearca sp.
Plicatula sp.
Spondylus? sp.
Exogyra sp.
Cymbophora? sp.
Syncyclonema? sp.
Granocardium? sp.
Inoceramid

GASTROPODS

Anchura? sp.
Turritella? sp.
Naticid

ECHINOIDS

Salenia hondoensis Cooke
Phyllobrissus cubensis (Weisbord)
Proraster dalli (Clark)

Remarks: The *Baculites* and echinoids are typical of early late Campanian rocks of the age of the Taylor marl in Texas and are consistent with assignment to the Anacacho Limestone.

USGS Mesozoic Locality: M8701.
Bexar County, Texas, San Antonio 1:250,000 quadrangle.
Cut on Rd 1957 ca. 5 mi W of Loop 1604 and just E of Lucas Ck.
Latitude: 29° 25.40' N; Longitude: 98° 47.40' W;
Collector: W. P. Elder, 1990; Field Identifier: 90ET-6.
Stratigraphic unit: Austin group

Stratigraphic unit: Austin group

TAXA PRESENT

BIVALVES

Inoceramus (Cordiceramus) mülleri? Petrascheck
Phrygia aucella (Römer)

Remarks: These taxa indicate that this locality lies in the middle to upper part of the Austin group.

USGS Mesozoic Locality: M8702.
Bexar County, Texas, San Antonio 1:250,000 quadrangle.
Pipeline excavation on Rd 1957 0.25 mi W of jct. of Rd 151.
Latitude: 29° 26.40' N; Longitude: 98° 40.25' W;
Collector: W. P. Elder, 1990: Field Identifier: 90ET-7.
Stratigraphic unit: Pecan Gap Chalk

TAXA PRESENT

AMMONITE

Baculites sp.

BIVALVES

Neithea sp.
Syncyclonema? n. sp.
Granocardium (Ethmocardium) cf. *G. (E.) conradi* (Stephenson)
Legumen cf. *L. elipticum* Conrad
Crassatella cf. *C. conradi* (Whitfield)
Lucina aff. *L. parva* Stephenson
Nemodon aff. *N. punctus?* Stephenson
Cymella bella Conrad
Endocostea baltica (Böhm)
Trigoniid

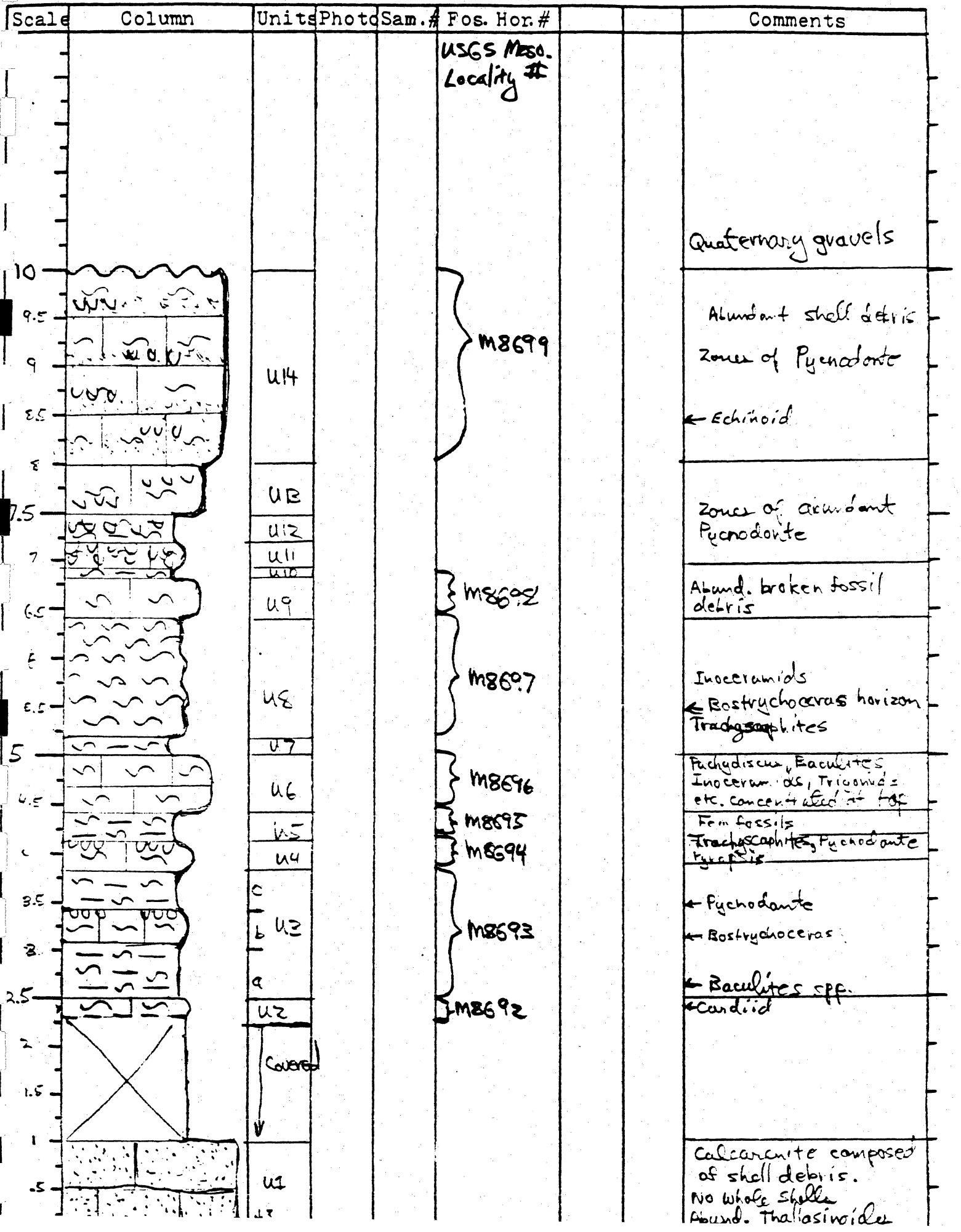
GASTROPODS

Arrhoges? sp.

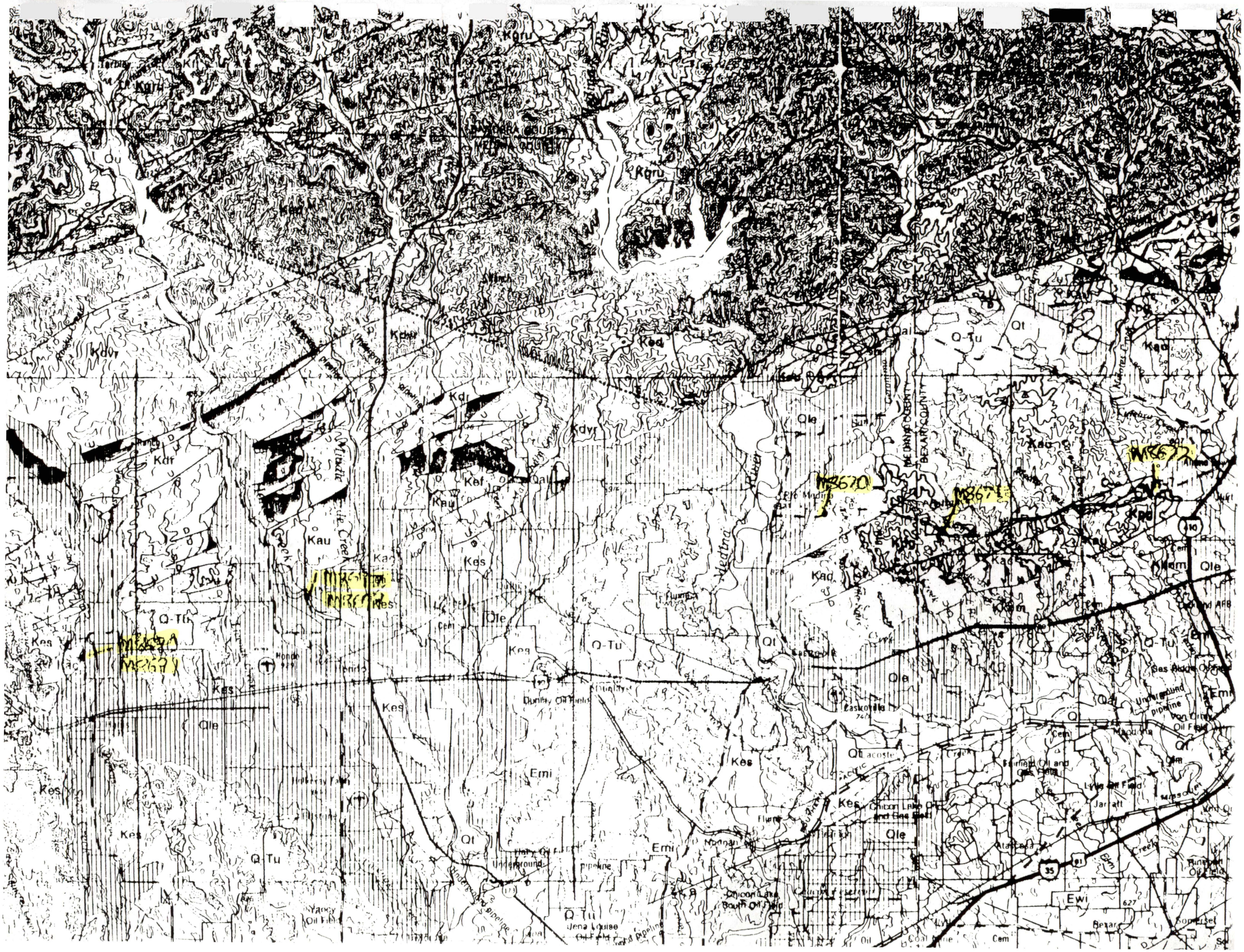
Remarks: This assemblage is indicative of rocks the age of the Taylor marl and is consistent with this locality lying in the Pecan Gap Chalk.

William P. Elder

Scale Meters LOCATION #: 90ET-4 SECTION #: Honda Creek, Texas Page 1 of 1 Date




LAMPASAS 87 MI
Canyon Lake
Ked
Kbu
Kdr
Qle
Kpg
New Braunfels
Kkm
Kknm
Qt
Emi
Ewi
Cem
Randolph AFB
Converse
Schertz
Selma
Universal City
Zuehl
Kh
Kau



MEDINA COUNTY
BEXAR COUNTY
Medina River
Middle Creek
Kdr
Kau
Kes
Kad
Ole
Emi
Ewi
O-Tu
Q-Tu
Qt
Qal
Caskoville
Flugne
Underground pipeline
35
Oil Field
Somerset
Bexar