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WOLFCAMP REFERENCE SECTION FIELD TRIP, HUECO MOUNTAINS, TEXAS

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Permian Expl, Boundaries & Stratigraphy
Sympm. & Field Trip / Midland's El Paso Co.
Guidebook
West Texas Geol. Soc.
1975

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Field Trip Leader
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A shelf reference section of the Wolfcampian Series was recently established in the Hueco Mountains, west Texas. It consists of five different segments, totaling almost 1600 feet of strata.

The five measured segments of Hueco Limestone, now designated the Hueco Group (Williams, 1963), consist of three formations: the Hueco Canyon Formation, including the Powwow Member, Cerro Alto Limestone, and Alacran Mountain Formation which includes the Deer Mountain Red Shale Member.

All of the areas to be visited are on privately owned land. Access to the various segments of the reference section must be obtained from the Diamond A Cattle Company at the ranch headquarters near the base and east of Cerro Alto. Please make a special effort to see that the land and gates are left in the condition in which they were found.

The reference section is situated in rugged and steep terrain. The area also is inhabited by rattlesnakes, scorpions, and thorny plants that are potentially dangerous. Appropriate precaution should be taken.

Observation of certain parts of the reference section require a moderate amount of climbing. Therefore, persons with restrictive health conditions should not attempt those portions of the trip.

Since the sections are on private property, the roads are not maintained at regular intervals. As a result, the condition of the roads is unpredictable and should be traversed with caution — high clearance vehicles are suggested.

The roadlog begins at the intersection of Montana and McRae streets in east El Paso heading east on Montana (U.S. Highway 62 and 180). This log parallels that of the November, 1968, W.T.G.S. Guidebook (p. 25-34) over parts of the planned route. The 1968 guidebook should accompany novices to the Hueco Mountains since it offers introductory and supplementary material not included in the present roadlog.

Road Log

Mi.	Accum. Mi.	
0.0	0.0	Intersection of Montana (U.S. Hwy. 62-180) and McRae Streets. Drive east on Montana.
3.3	3.3	Radar monitor site on left.
2.2	5.5	Intersection with Loop 375.
1.5	7.0	Hueco Club entrance on right.
1.8	8.8	Intersection with FM Road 659.
8.0	16.8	Road to El Paso Natural Gas Company compressor station on right.
0.8	17.6	Ranch Road 2775 to Hueco Tanks State Park on left.
0.6	18.2	Helms Peak on right at 3:00, entering Powwow Canyon.
1.3	19.5	Coca Cola advertisement sign on left, 100 yards beyond on left is entrance gate to Blabber Tank Canyon section (Fig. 2) which is the basal segment of the reference section. Angular unconformity on left.
2.3	21.8	Roadside park on left. Stop 1. This roadside park is located in Powwow

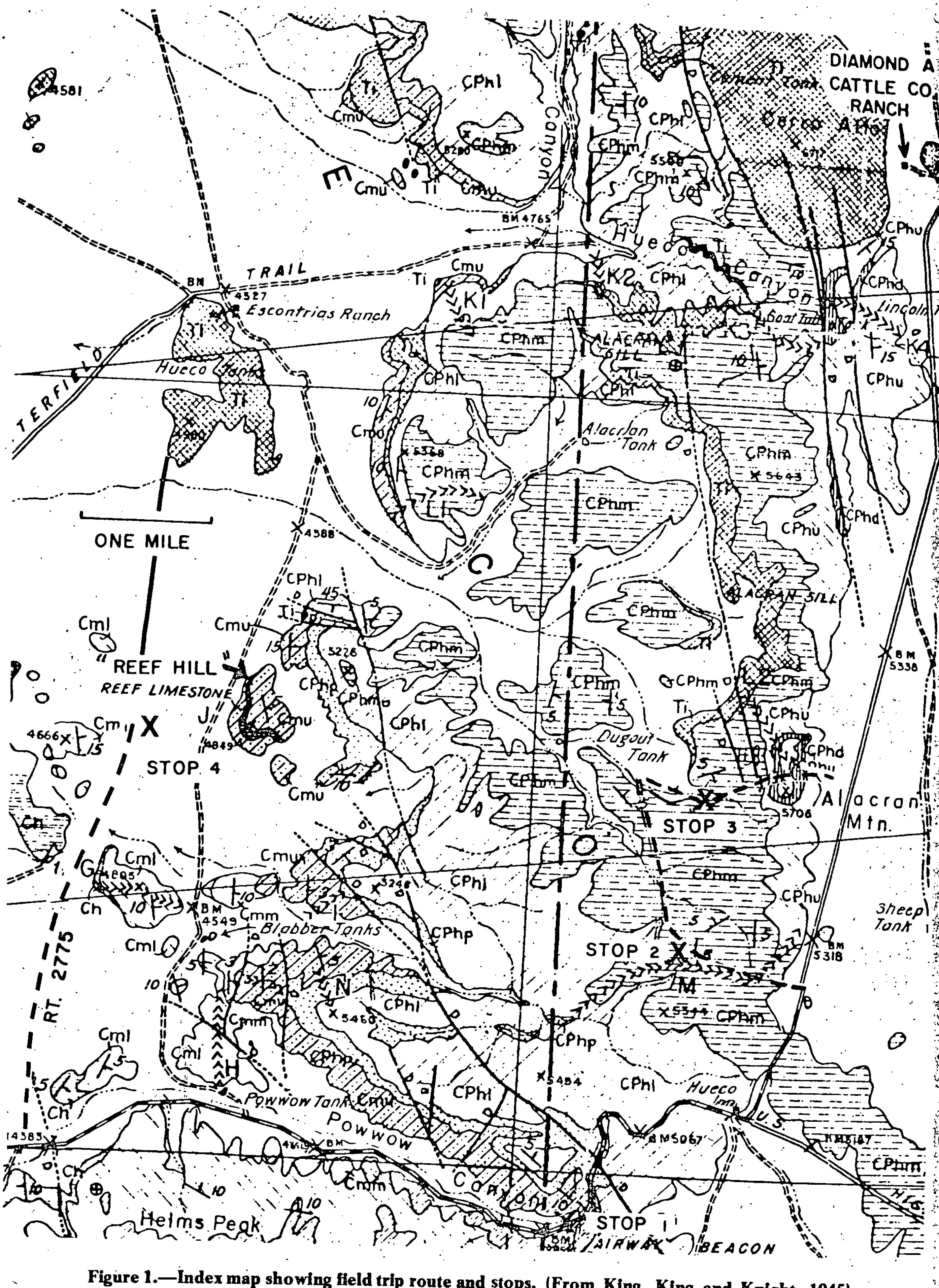

Figure 1.—Index map showing field trip route and stops. (From King, King and Knight, 1945).

Figure 2.—Tl
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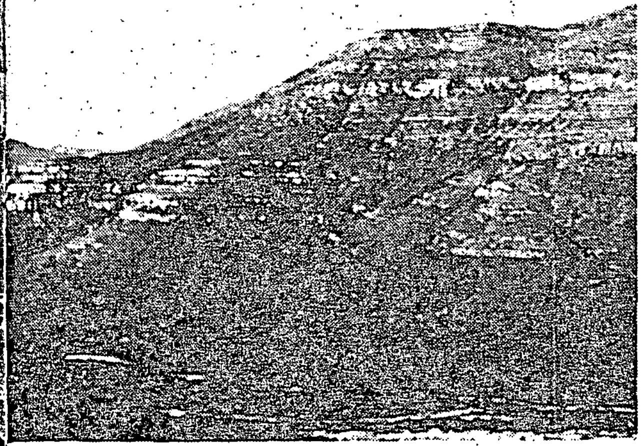

Figure 2.—The basal segment (units 1-70) of the Wolfcamp reference section in Blabber Tank Canyon. View is to the northwest.

Figure 3.—Roadcut on Carlsbad Highway (U.S. 62-180) showing partial exposure of the Powwow Member of the Hueco Canyon Formation.

Canyon at or near the El Paso - Hudspeth County line. To the north and east can be seen Permian beds (Wolfcampian) and Pennsylvanian beds (Missourian) separated by a gentle 10-15 degree northeast dipping angular unconformity. The lowermost Wolfcamp unit is the Powwow Member of the Hueco Canyon Formation, a pebble-cobble conglomerate with marine and nonmarine shales. I have identified in Blabber Tank Canyon at least two different phases of conglomerate formation. Thickness of the Powwow varies from zero to about 95 feet. It is usually covered, but does have good exposures in arroyos. From a distance it can sometimes be identified by the covered slope, reddish soil exposures, or by identifying the angular unconformity. King and King (1929) established the type locality for the Powwow Member in this canyon. Those authors also presented diagramatically how the Powwow thins and pinches out by onlap just southeast of the airway beacon. The Carlsbad Highway (U.S. 62-180) exposes the Powwow in a roadcut (Fig. 3) almost a mile northeast of this park. Other roadcuts east to the Hueco Inn on this highway expose the lower and middle Hueco Canyon Formation. As seen in these roadcuts, little shale occurs in this formation. The rock is predominantly wackestones with occasional mudstones or packstones. The basal yellowish brown, ledge-forming outcrop consists of a mechanically accumulated (wave and current formed) crinoid-echinoid bank (grainstone). It is usually biostromal, although it may be biohermal in places, and consists of cross-bedded to bedded bioclastic debris which includes silicified echinoid plates, spines, brachiopods, and crinoid stems. This unit is distinct and traceable over relatively long distances. The overlying beds are of clean limestone and dolomitic limestone, many with fusulinids (Fig. 4), until about Unit 89 where the beds

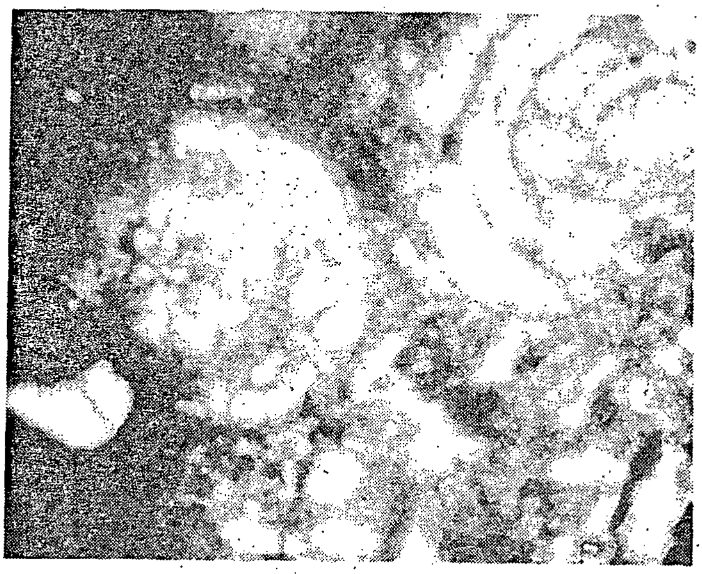

Figure 4.—Staffella biomicrudite. A rare, well-preserved Staffella in a bed of abundant, highly recrystallized Staffella and other fusulinids. Unit 39.

become dolomitized up to Unit 102, which also is the depositional contact between the Hueco Canyon Formation and the Cerro Alto Limestone.

The lowermost Wolfcamp is not represented in the Hueco Canyon Formation. Erosion, prior to Powwow deposition, probably removed these beds if they were deposited at all. Fusulinids collected by the writer from the lowest beds above the Powwow, and identified by A.E. Kauffman, W.J. Stewart and H.E. Williams, are Schwagerina sp., Pseudoschwagerina aff. P. texana, Schubertella sp. and Triticites sp., late-early to early Wolfcampian forms.

A detailed discussion and section at this roadside park are presented by Ken Seewald in the West Texas Geological Society 1968 Delaware Basin Exploration Field Trip Guidebook.

0.7 22.5 Powwow conglomerate and red shales in roadcut (Fig. 3). See also mile 53.7 in 1968 guidebook.

1.3 23.8 Hueco Inn. Turn left on unpaved county road 100 yards east of Inn.

0.6 24.4 Hill to left is Cerro Alto Limestone.

0.1 24.5 Crossing dry gulch. Beds on left provide good fossil collecting in Cerro Alto.

0.4 24.9 Turn left through gate (Diamond A Cattle Co.). Immediately after turn, note hill at right (3:00) which is a portion of the upper part of the reference section (D-D) to be examined at Stop 2.

0.5 25.4 Dry draw is reference section C-C.

0.3 25.7 Fence with wire gate.

0.1 25.8 Crossing draw, top of section B-B.

0.2 26.0 Stop 2. Park vehicles at intersection of ranch roads. Remain in right-hand fork of road. Walk southwest into canyon.

LOWER CERRO ALTO LIMESTONE AND DEPOSITIONAL BASAL CONTACT

Looking south into the canyon, the beds can be seen to change from a light gray dolostone to overlying medium to dark gray limestone. This change in color represents the depositional contact between the Hueco Canyon Formation and the Cerro Alto Limestone.

The contact (Fig. 5) is not simply a color change in the rock. Also associated with this contact is a lithologic change (dolomitization), a faunal change, and an obvious depositional change represented by the increase of interbedded shale in the Cerro Alto Limestone.

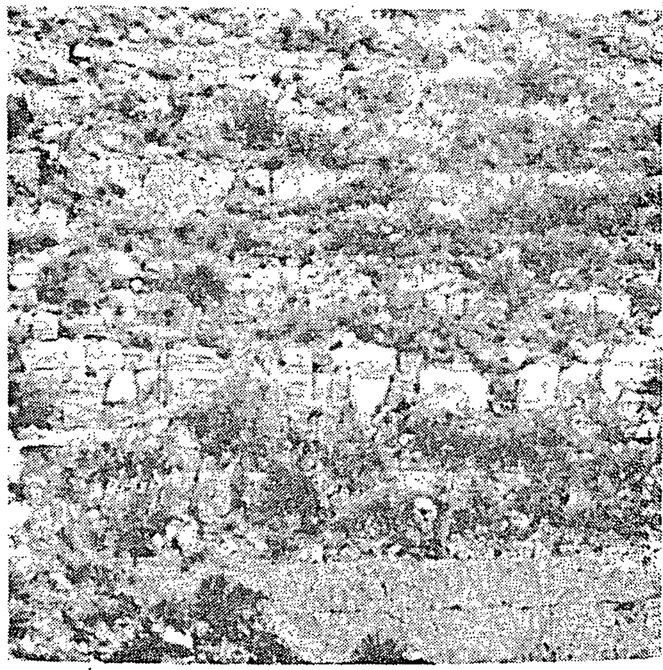

Figure 5.—Depositional contact between the Hueco Canyon Formation (white dolomitized outcrops) and the overlying darker Cerro Alto Limestone.

Thin sections show complete dolomitization (Fig. 6) from about Unit 89 through Unit 102. Fossils such as Staffella, other benthonic forams, worm burrows, ostracods, blue-green algal-coated grains, dasyclad algae,

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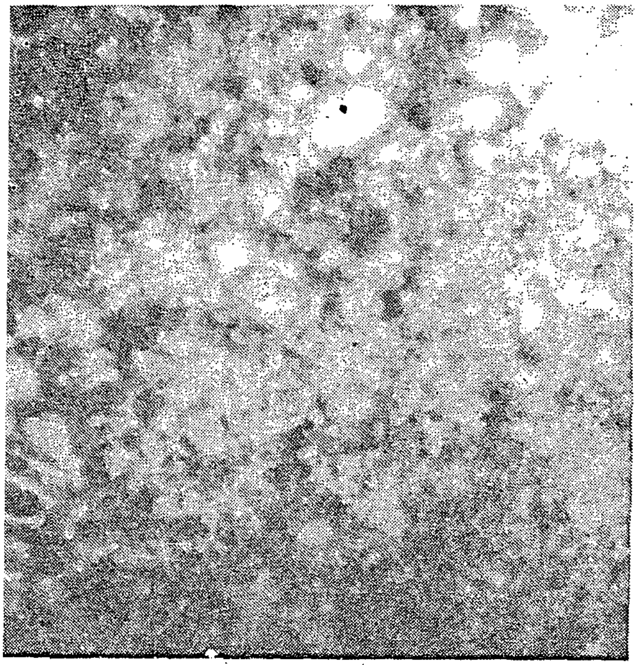


Figure 6.—Dolomitized micrite. Fracture and dasyclad algae "ghost" structures, consisting of sparry calcite, occur in a completely dolomitized matrix. Some dolomitization porosity has resulted. Unit 101.

and a lack of stenohaline organisms, suggest very shallow water with possible variations in salinity. Units 95 through 100 show shallow channeling has occurred. In Units 100, 101, and 102, algal stromatolites, dessication marks, and worm burrows can be seen in the beds. The shallowing conditions

Figure 7—Large Pterinites (bivalve) seen in outcrops of Unit 109.

and features seen, indicate a sabkha type environment of deposition at the end of Hueco Canyon time. This might also account for the dolomitized sequence of beds.

At the beginning of Cerro Alto deposition (Unit 103), conditions changed to a more lagoonal, back reef environment. Terrestrially derived sediments from northern positive areas, in the form of shales and siltstones, were deposited. Thin section studies and field examinations show a significant change in fossil organisms. Bivalves (Pterinites, Fig. 7) and gastropods (Straparolus and Euomphalus) become abundant in parts of this formation. A biologic assemblage

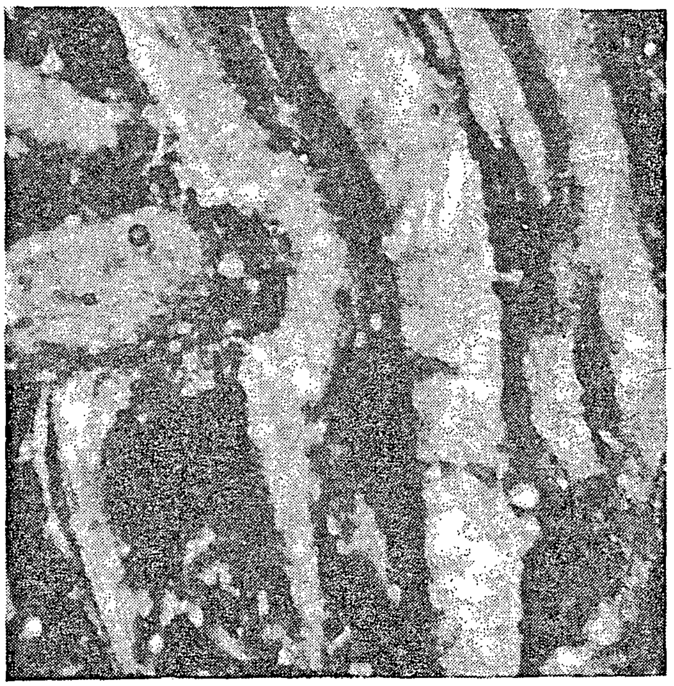


Figure 8.—Bivalve biomicrite. In thin section, this packstone consists of abundant bivalves with embayed grains as a result of compaction. Unit 131.

of bivalves (Fig. 8) occurs up to Unit 132. In thin section, ostracods, echinoids, ophthalmid forams, phylloid algae (Codiaceae, Fig. 9), and dasyclad algae (Epimastopora and Permicalcus, Figs. 10, 11, and 12) can be seen throughout this formation. Fusulinids, with the exception of Staffella, are rare until Unit 165 where they begin to increase in numbers and occurrences. The top of the Cerro Alto Limestone is at the top of Unit 209.

Figure 9.—Algal biomicrite. Phylloid algae blades and other allochems are encursted with blue-green algae forming algal oncolites. Unit 166.

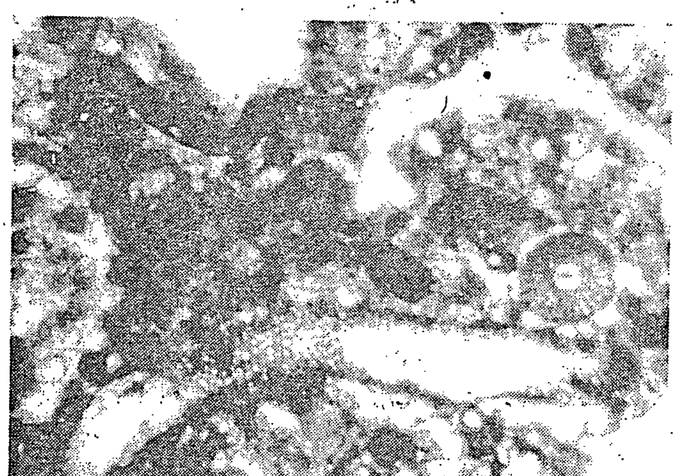


Figure 10.—Biomicrite. Ophthalmid forams, echinoid spines, brachiopods, crinoid fragments, and excellent Permicalcus (dasyclad alga). Unit 109.

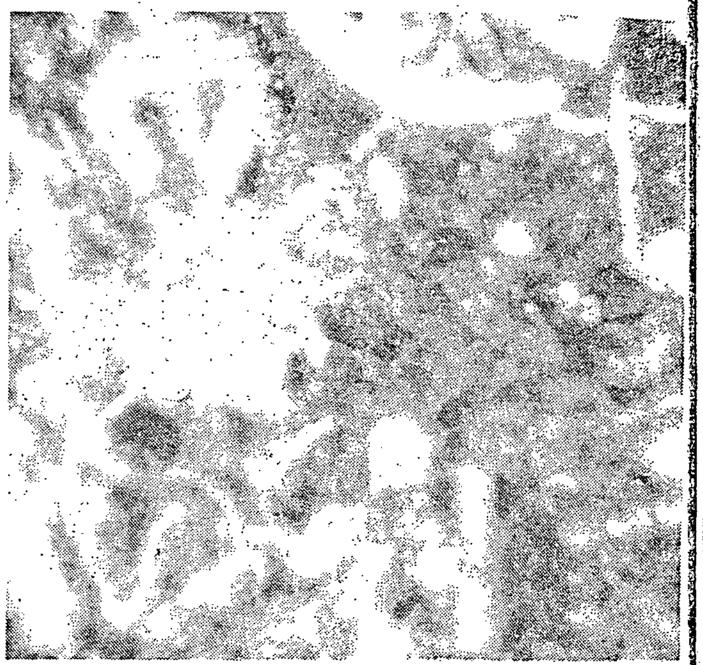


Figure 11.—Algal biomicrite. Phylloid (Codiaceae) algae, Permicalcus (Dasycladaceae), and ophthalmid forams. Unit. 141.

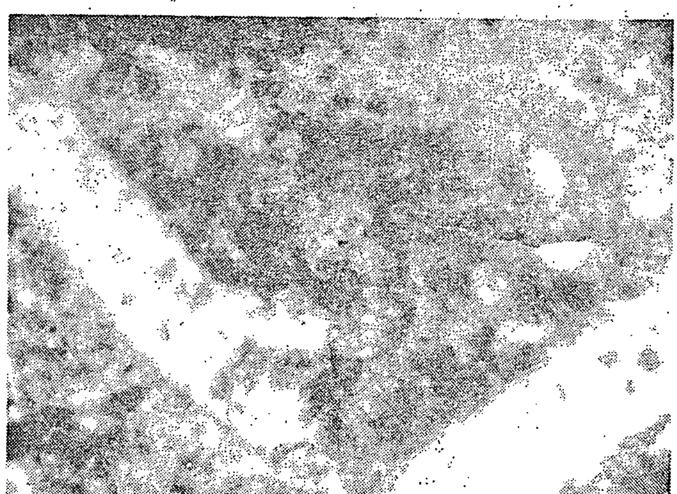


Figure 12.—Algal biomicrite. Photomicrograph shows Epimastopera (Dasycladaceae).

MI.	Accum. Mi.	
		Drive down the right fork of the road toward Cerro Alto Peak.
1.1	27.1	Good fossil collecting locality.
0.9	28.0	Water pump station and road intersection. With pump station at 12:00 Alacran Mt. is at 3:00, Hueco Tanks at 10:00. In the far distance at 11:00 are the Organ Mts. Turn right toward Alacran Mt.

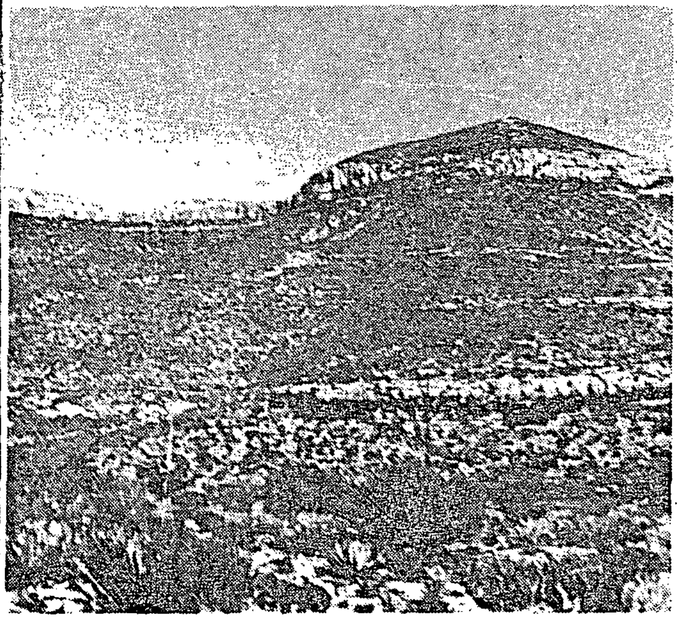


Figure 13.—Looking east at Alacran Mountain. The Deer Mountain Red Shale Member lies just below the upper cliffs in the covered slope interval. Notice the many cliff-forming bioherms. The dashed line marks the base of the Alacran Mountain Formation.

0.4 28.4 Stop 3. This stop consists of a hike up Alacran Mt. (Fig. 13) to examine the upper segment of the reference section.

The uppermost bed at section D-D (stop 2) is a bioherm and is traceable for more than a mile north to the base of Alacran Mt. Several sequences of cliff-forming bioherms (Fig. 13) can be identified at Alacran Mt. as they trend north-south and thin or thicken to the east and west.

Like the Cerro Alto Limestone, interbedded shales are also encountered in this predominantly limestone section. The 115 feet thick Deer Mountain Red Shale Member forms the slopes just below the uppermost cliff-forming bioherms. This member is considered the southern extension of the upper tongue of the Abo Formation of the Sacramento Mountains (Pray, 1961; Otte, 1959; Thompson, 1954 and others). The calcareous shale creeps downward in the weathering zone and causes the immediately overlying limestone beds to slump over the upper parts of the shale.

Excellent silicified fossils can be found in the upper Cerro Alto Limestone and the Alacran Mountain Formation. Crinoid stems, various productid brachiopods, and other invertebrates (Fig. 14) can be found throghout the Alacran Mountain Formation. The major sediment baffling organisms in the bioherms are crinoids and phylloid algae. It seems that occurrences of phylloid algae this high in the Permian may be unusual (Klement, unpublished MS).

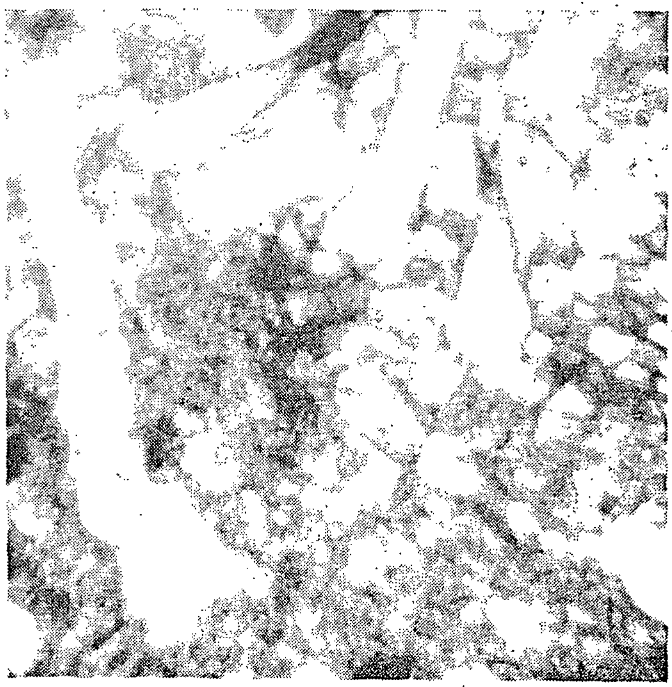


Figure 14—Dolomitic biomicrite. Fistuloporid bryozoa, uniserial forams, and highly recrystallized ostracods. Index No. HA 20 F.

Williams (1963) encountered Schwagerina crassitectoria in a downfaulted block several miles north of Alacran Mt. The interval where it occurs, according to Williams, is stratigraphically higher than the highest bed at Alacran Mt.

3.5 31.9 Drivers retrace route to main gate. Follow ranch road inside (west) of gate which parallels county road and fence.

1.3 33.2 Turn left at cattle pens and go west about 0.2 mile and then turn right and go about 0.5 mile north where hikers will gather after hiking over Alacran Mt. Retrace route to Ranch Road 2775.

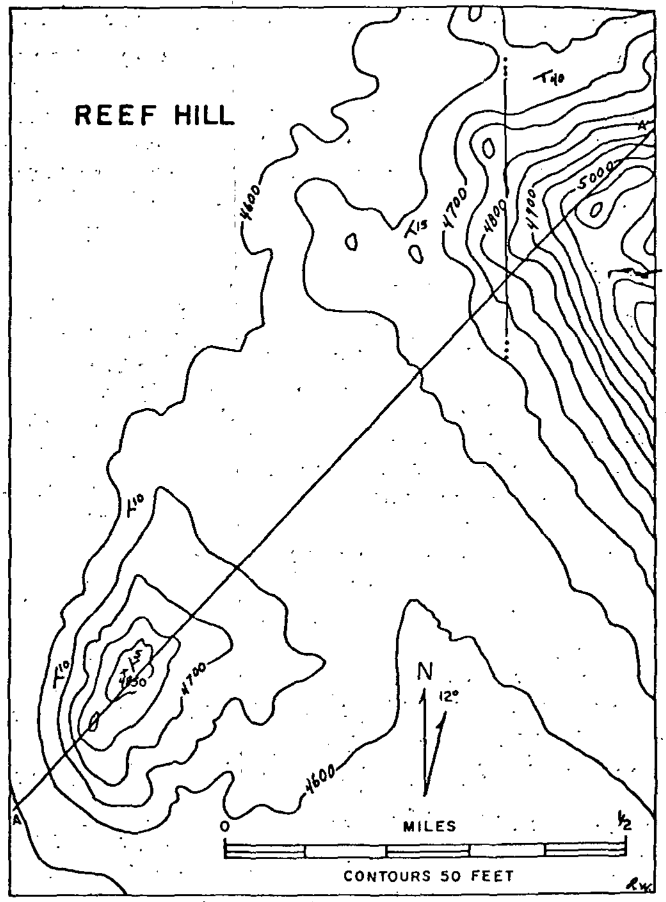
OPTIONAL TRIP.

0.0 0.0 Turn right on Hueco Tanks Road (2775) from Highway 62-180.

2.6 2.6 "Reef" Hill at 12:00, Hueco Tanks at 10:00.

0.9 3.5 Turn right on dirt road and park. Stop 4. (optional). "Reef" Hill.

"Reef" Hill, located in front of the western escarpment just south of Hueco Tanks, consists of Upper Pennsylvanian (Virgilian) and Lower Wolfampian strata. Several algal (phylloid) bioherms can be seen on the



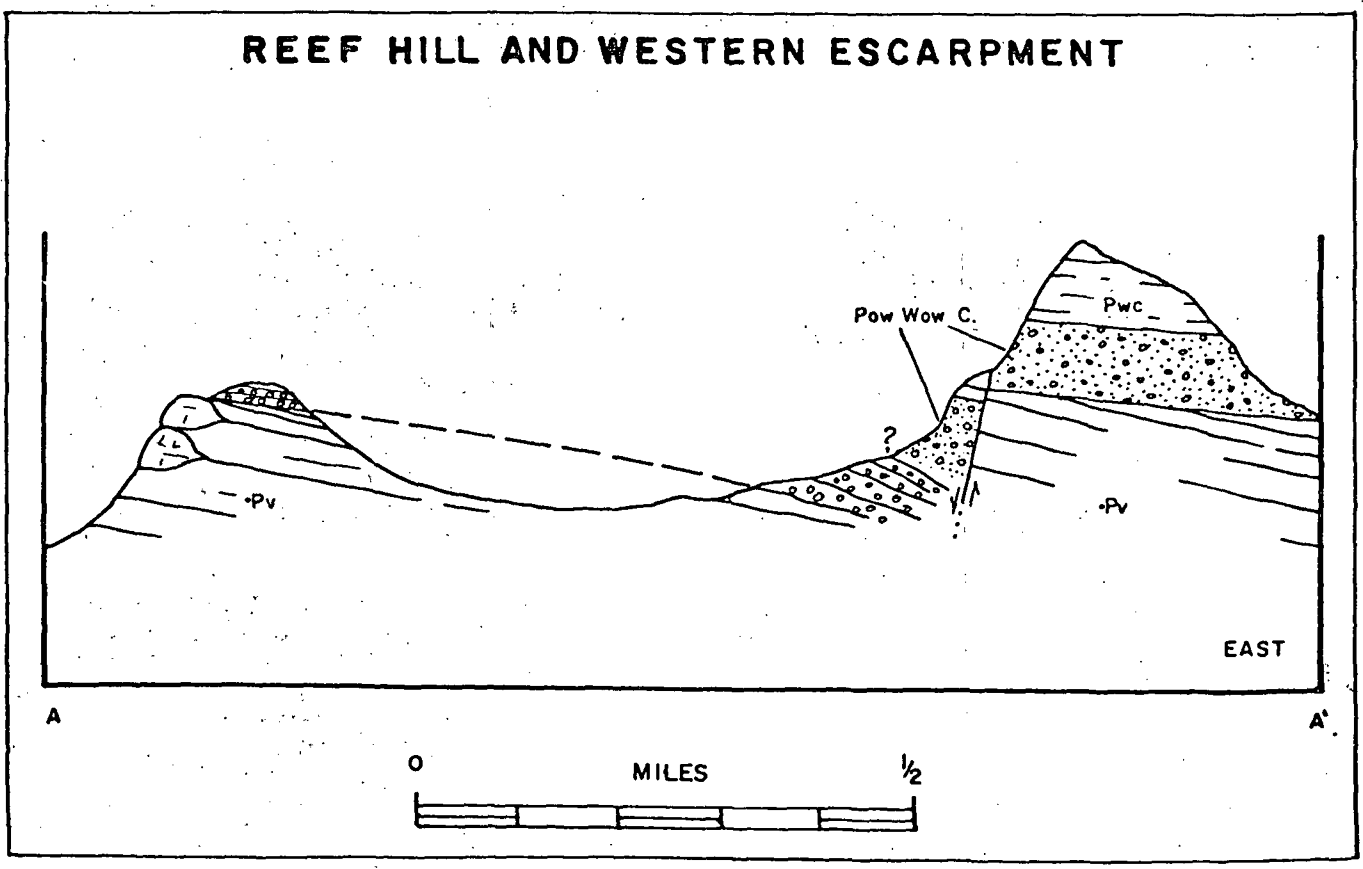


Figure 15.—Cross section across "Reef" Hill.

west side of this hill. Above the bioherms is a sequence of alternating conglomerate and limestone beds, lying unconformably on the biohermal beds. The conglomerate beds dip east at about five degrees while the beds below the conglomerate sequence dip east at about ten degrees.

Between the western escarpment and "Reef" Hill (about one-half mile) a sequence of east dipping conglomerate beds are again encountered (Fig. 15). These beds are very similar in lithology to those of "Reef" Hill. This is locality 1 of Williams (1963) where he collected fusulinids and referred them to "Bursum" types.

NOTE: Also at Stop 4, Mr. Wendell J. Stewart, of Texaco Inc., will speak briefly on the petrologic, stratigraphic, and paleontologic relationships of the "Reef" Hill area and discuss the base of the Permian. He has published a number of papers on carbonate rock studies in the Permian basin, but is best known for his extensive Permian fusulinid research which includes detailed measured sections of the Pennsylvanian and Permian in the Hueco Mountains.

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STRATIGRAPHIC COLUMN FIELD DESCRIPTION

WOLFCAMPIAN SERIES (HUECO GROUP) HUECO MOUNTAINS, TEXAS

LARRY WOLLSCHLAGER
University of Texas at El Paso

HUECO CANYON FORMATION

Pow Wow Member	Highly covered pebble-cobble conglomerate containing marine fossils and horizons of red and yellowish brown shale, as well as shale-free horizons. This unit varies in thickness from 0 to about 95 feet.
H1 - H2	Mild outcropping to slope-forming medium gray wackestone. Abundant fusulinids, phylloid algae, and brachiopods occur in these basal units. (N 5)
H3 - H6	Biohermal grainstone grading laterally to a biostrome. This is the first prominent outcrop above the Pow Wow Member, and consists of cross-bedded, sandy, yellowish gray (5 Y 7/2) limestone containing silicified crinoids, echinoid plates and spines, and brachiopods.
H7 - H9	Shaley, thin-bedded, slope-forming, partially covered wackestone, containing gray and pink chert nodules. Contains fusulinids. (N 5)
H10 - H16	Outcropping medium-bedded wackestone containing chert nodules, fusulinids, crinoid stems, and shell fragments. (10 YR 6/2)
H17 - H21	Slope-forming, thin-to medium-bedded wackestone. Contains fusulinids and silicified shell fragments. (10 YR 6/2)
H22 - H25	Thick-bedded outcropping mudstone, containing chert nodules. (5 Y 6/1)
H26 - H30	Thick-bedded outcropping wackestone with occasional shaley nodular bedding. Contains echinoid spines, brachiopods, gastropods, crinoids, fusulinids. At the base of unit 28 a large Favosites coral occurs. (N 5)
H31 - H39	Thick-bedded, massive, outcropping mudstone to wackestone. Contains orange and white chert nodules and lenses, fusulinids (abundant Staffella occur in upper beds), and phylloid algae. (5 Y 6/1)
H40	Mild outcropping, olive gray packstone containing abundant fusulinids and algae. (5 Y 4/1)

H41 - H46	Shaley, thin-bedded, flaggy and nodular wackestone, partially covered in areas. Fusulinids weather out of the marls and shales in these units. (5 Y 4/1)
H47 - H59	Coarse, thick-bedded, mild outcropping wackestone containing occasional chert nodules and fusulinids. (N 7)
H60 - H65	Massive, outcropping chert-poor wackestone containing stylolites, crinoid stems, fusulinids, and brachiopods. (N 7)
H66	Slope-forming, medium-bedded, very light gray fusulinid wackestone. (N 8)
H67 - H69	Mild outcropping, coarse, cherty wackestone to grainstone with occasional silicified fossils. (5 Y 7/2)
H70 - H74	Outcropping chert-free wackestone. (unit 70 ends section "AA"). (5 Y 6/1)
H75 - H77	Slope-forming, flaggy weathering wackestone with some interbedded shales. (5 Y 6/1)
H78 - H84	Prominent medium-to thick-bedded, outcropping coarse mudstone and wackestone containing orange and gray chert nodules. (5 Y 6/1)
H85 - H89	Slope-forming, mild outcropping mudstone and wackestone containing pink and gray chert nodules in upper beds. (5 Y 4/1)
H90 - H102	Steep, slope-forming, mild outcrops of thin-to medium-bedded cherty (nodules and lenses) mudstones and wackestones. Units 92 and 93 contain siliceous sponges in growth position. (5 Y 8/1)

CERRO ALTO LIMESTONE

H103 - H109	Slope-forming, medium-bedded, mild outcrops of dark fossiliferous, chert-free limestone and interbedded shales. Abundant ostracods, gastropods, brachiopods, echinoid spines, and bivalves (Pterinites) occur in these beds. Unit 108 is characterized by numbers of external molds of gastropods and other shelled organisms. (5 Y 4/1)
H110 - H123	Slope-forming mild outcrops of thin-to medium-bedded, often flaggy weathering wackestones with interbedded shales. Gastropods, brachiopods and bivalves can be seen. One nautiloid was found in unit 113. (5 YR 4/1 - 5 Y 4/1)

H124 - H127	Mild outcropping, iron stained, thin-bedded mudstones, wackestones, and packstones with some interbedded shale. (5 Y 5/2)
H128 - H130	Gentle slope-forming, partially covered wackestone, with interbedded shales. (N 5)
H131	Bivalve packstone, usually covered except in arroyos. (5 Y 4/1 - 5 Y 6/1)
H132 - H135	Slope-forming, thin-bedded, often covered wackestone. Much interbedded shale occurs. (5 Y 4/1)
H136 - H139	Partially covered interval with thin-bedded, smooth weathering mudstones and interbedded shales. (N 6 - 5 Y 6/1)
H140 - H142	Partially covered, smooth weathering wackestone with visible gastropods and brachiopods and phylloid algae in some beds. (N 6)
H143 - H149	Mild outcropping to slope-forming, thin-bedded wackestones with occasional interbedded shales. Increasingly fossiliferous. (5 Y 6/1)
H150 - H152	Mild outcropping, smooth wackestone with less interbedded shale. (10 Y 4/2)
H153 - H157	Siliceous, thin-bedded, outcropping wackestones with abundant irregular silica stringers and gray chert nodules. <u>Wewokella</u> sponges are common in unit 157. (5 YR 5/6)
H158	Mild outcropping, medium-bedded wackestone-packstone with high organic content. Much less silicification than previous units. Sponges and phylloid algae are noticeable. (10 Y 4/2)
H159 - H163	Slope-forming, shaley, nodular wackestone with much talus and soil covering. No rock taken at 160, 162, and 163. Probably extremely shaley with interbedded thin limestone units.
H164	Thin but distinct algal wackestone unit (1 foot thick). Abundant phylloid algae occur with gastropods in this bed. (10 YR 5/4)
H165 - H166	Thin-to medium-bedded, outcropping wackestone with fusulinids, gastropods, and brachiopods. Some minor shale and iron stains also occur. Silicification resumes at the top of unit 166. (5 Y 7/2)

H167 - H169	Medium-bedded outcropping wackestones with chert nodules, silica stringers, and abundant silicified gastropods with excellent preservation. Echinoid plates and sponges can also be seen. Little shale occurs. (5 Y 7/2)
H170	Outcropping thin-bedded mudstone with desiccation cracks. Hematite occupies the desiccation cracks and is highly conspicuous. This is a traceable bed over moderately long distances. (10 YR 4/2)
H171	Medium-bedded, fossiliferous packstone with abundant gastropods, brachiopods, sponges, crinoid remains, and phylloid algae. (N 6)
H172	Seven feet of dark yellowish brown, calcareous shale with large productid brachiopods. Covered at section "CC", but well exposed near the base of arroyo section "DD". (10 YR 6/6)
H173	Covered to outcropping, medium grained wackestone with productid brachiopods. No silicification. (10 YR 6/2)
H174	Thin-to medium-bedded, outcropping wackestone with silicified fossils. (5 Y 4/1)
H176 - H183	Thin-to medium-bedded, outcropping siliceous wackestone. Chert nodules, silica stringers, and silicified fossils occur in these beds. Silica content decreases upward. Some interbedded shales can also be seen. (5 Y 6/1 - 5 Y 4/1)
H184	Thin-to medium-bedded, mild outcropping, silicified phylloid algae wackestone. (5 Y 4/1)
H185	Mild outcropping fusulinid wackestone-packstone. (5 Y 4/1)
H186 - H199	Mild outcropping, siliceous, light gray wackestone with interbedded shale. Fusulinids, crinoids, phylloid algae, gastropods, shell fragments, and chert nodules can be seen. (5 Y 6/1 - 5 Y 4/1)
H200	Medium-to thick-bedded wackestone containing small brachiopods and various amounts of silica. (5 Y 6/1)
H201 - H202	Slope-forming, thin-bedded, partially covered mudstone with much interbedded shale. (5 Y 4/1)
H203 - H209	Mild outcropping, thin-to medium-bedded wackestones and mudstones. Units 206 and 207 of this sequence become thicker, or biostromal, to the north. (5 Y 6/1)

(End of section "DD")

ALACRAN MOUNTAIN FORMATION

HA1 (210) - HA7	Very coarse weathering, massive bioherm containing sponges, solitary corals, phylloid algae, with silicified brachiopods and crinoids in the upper portions of these units. This mudstone to wackestone bioherm is traceable for almost two miles and is important for correlating strata over long distances. (5 Y 6/1 - N7)
HA8 - HA13	Slope-forming, partially covered, thin-bedded wackestone with excellent silicified brachiopods in association with bryozoa (Fenestella) and phylloid algae. (5 Y 6/1)
HA14	Dark, thin-bedded crinoidal packstone also containing spines and bryozoa. (N4)
HA15 - HA21	Thin-to medium-bedded, mild outcropping wackestones with interbedded shales. Contains crinoids, bryozoa, and brachiopods which are sometimes strongly silicified. (Measured in first arroyo to the north of the thinning basal bioherm.) (5 Y 6/1)
HA22	Medium-bedded outcropping wackestone. Contains many phylloid algae, brachiopods, crinoids, and bryozoa. Many fossils are silicified. (5 Y 4/1)
HA23	Medium-bedded outcropping wackestone. Contains phylloid algae, brachiopods, and crinoids. (5 Y 6/1)
HA24 - HA25	Slope-forming, thin-to medium-bedded wackestone with silicified brachiopods. (5 Y 6/1 - 5 Y 4/1)
HA26	Outcropping medium-bedded crinoid wackestone-packstone. Unit is biostromal and contains pink chert nodules and large crinoid stems.
HA27	Fusulinid wackestone. Contains brachiopods and is a slope former. (5 Y 6/1)
HA28 - HA31	Mild outcrops of partially covered, slope-forming wackestones. Fusulinids, brachiopods, and phylloid algae can be seen. Covered areas are probably thin bedded limestone and shale. (5 Y 6/1 - 5 Y 4/1)
HA32 - HA34	Outcropping thick-bedded mudstone to wackestone biostrome containing crinoid stems and brachiopods which are often silicified. This unit can be seen slumping further north. (5 Y 6/1 - N5)

HA35 - HA40	Outcropping medium-bedded limestone, partially covered in lower units (35 - 36). Consists of wackestones with abundant well preserved silicified fossils. Unit HA40 is highly iron stained in places. (5 Y 6/1 - 5 Y 4/1)
DEER MOUNTAIN RED SHALE MEMBER	
HA41	Consists of 115 feet of fine grained, maroon, nonfossiliferous, calcareous shale. The shale weathers deeply and produces red soil which tends to creep in the weathering zone. The shale member is usually covered by red soil, even in arroyos.
HA42 - HA43	Dark, thin-bedded wackestone (unit 43, mudstone). Chert, corals, bryozoa (Fenestella), brachiopods, bivalves (?), and spines are found in these units. These beds slump over the underlying shale as this weathered shale moves downward by creep. (5 YR 2/1 - 5 Y 4/1)
HA44 - HA45	Light gray, thick-bedded, outcropping bioherm containing bryozoa, silicified brachiopods, and phylloid algae. (5 Y 2/1 - 5 Y 4/1)
HA46 - HA50	Thin-bedded, medium to light gray limestone containing abundant nodules and lenses of chert. Corals, bryozoa, and brachiopods occur in these beds. (5 Y 4/1)
HA51 - HA59	Massive, light gray, cliff-forming bioherms containing brachiopods, phylloid algae, crinoids, and fusulinids. (5 Y 4/1)
HA60 - HA70	Thin-to medium-bedded, partially covered, slope-forming, cherty limestone with occasional minor interbedded shales. Resembles units 44 - 50. Fusulinids, crinoids, echinoid plates, brachiopods, and gastropods occur in these beds. (5 Y 4/1)
HA71 - HA72	Outcropping thick-bedded wackestones containing orange chert nodules, cephalopods, fusulinids, gastropods, and crinoids.
HA73 - HA75	Outcropping medium-to thick-bedded wackestones containing crinoid stems, brachiopods, fusulinids, and gastropods (unit 74 contains abundant large gastropods). Silicification occurs as chert nodules, silica stringers, and fossil replacement.
HA76	Thin-bedded, slope-forming unit containing echinoid spines, gastropods, crinoid stems, and brachiopods. Pink chert nodules can also be seen.

(End of Alacran Mountain section "EE")

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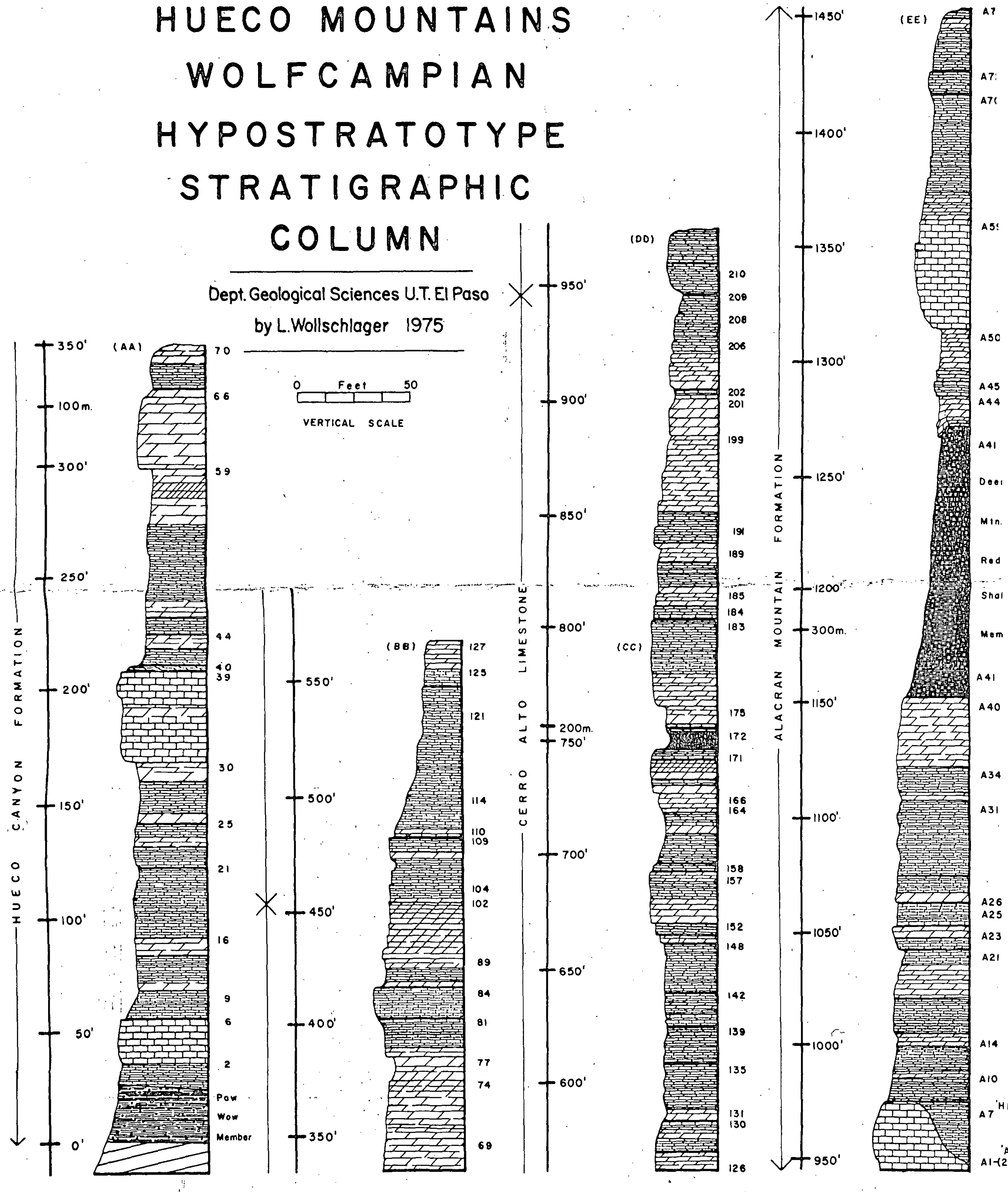

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