

collections. Dr. K. J. Boss, Museum of Comparative Zoology, provided information on the holotype of *Fusinus ampliurgus*. Mrs. Sally D. Kaicher, St. Petersburg, provided illustrations of holotypes of *F. ampliurgus* and *F. halistreptus* and photographed the other specimens. Mr. Riley Black, Ft. Myers, Florida, provided information regarding initial specimen capture. All are gratefully thanked.

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A NEW FOSSIL ASHMUNELLA (PULMONATA:POLYGYRIDAE) FROM THE SIERRA DIABLO AND HUECO MOUNTAINS, TEXAS

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ABSTRACT

A new species of fossil polygyrid land snail, Ashmunella watleyi, is described. The species has been found in deposits of probable late Pleistocene age in the Sierra Diablo and Hueco Mountains of western Texas. An associated molluscan fauna is reported and paleoecological implications discussed.

Extreme western Texas is located in the Basin and Range Physiographic Province. Some "ranges" may be no more than uplifted plateaus between lower-lying basins. Such is the Diablo Plateau, located mainly in Hudspeth County, Texas. It is bordered by the Salt Basin on the east and Hueco Bolson on the west. Fenneman (1931: 395) characterized the area thus: "Near the Texas boundary there rises. . . the Diablo Plateau. . . bounded by faults and sloping eastward. . . The dissected fault scarps on both sides appear as mountains when viewed from the basins. That on the west, 2,000 ft. high, is known as the Hueco Mountains and farther south as the Finlay Mountains. The somewhat lower scarp on the east is the Diablo Range." The fossils treated herein are from the Sierra Diablo (Fenneman's "Diablo Range") and the Hueco Mountains. The bedrock of both ranges is predominantly limestone of Permian age.

The fossiliferous deposits at the type locality (Loc. 1, described at end of paper) occur on an east-facing slope in the upper end of the main, south arm of Victoria Canyon, which debouches eastward into Salt Basin. The deposits are of sharply angular limestone rock rubble, derived from the Permian bedrock of the area, with interstices filled with silts of rock color "Moderate yellowish-brown, 10YR 5/4." The rubbly deposit forms a mantle on the lower part of the slope. Eleven species of gastropods have been taken from this deposit, including an *Ashmunella* judged to be new. From the Hueco Mountains only one specimen of *Ashmunella* has been taken at each of two localities (Locs. 2 and 3). These shells also were obtained from deposits of hillslope colluvial mantle.

***Ashmunella watleyi* new species**

(Figs. 1-4)

Description of Holotype: Shell moderately

thick, 12.5 mm in diameter and 5.35 mm high; moderately depressed with spire forming angle of 145° ; angular peripherally with angulation at $\frac{2}{3}$ height of body whorl; body whorl not descending; umbilicus narrow, 2.1 mm wide and contained 5.95 times in diameter of shell; aperture obliquely oriented at angle of 60° to vertical, 3.5 mm high and 3.8 mm wide. Peristome thickened, lamellar and distinctly raised above subtending body whorl surface on parietal wall and forming callus in outer lip. Parietal peristome bearing two denticles: (1) a single, much larger, obliquely oriented lower tooth, 2.3 mm long and 0.6 mm high, bearing a short ventroposteriorly inclined "tail" below; (2) an upper tooth oriented horizontally, scarcely more than an elongate swelling, *ca.* 0.6 mm long and not joining the lower tooth posteriorly. Callus of outer lip subtending three denticles: (1) uppermost (palatal) denticle subrectangular with straight outer margin, 1.4 mm long and rising 0.45 mm above lip callus, separated by 0.7 mm from middle tooth; (2) middle tooth peg-like, 0.7 mm wide, rising 0.6 mm above callus and separated by 0.75 mm from lowermost (basal) tooth; (3) basal tooth rounded and oriented obliquely on callus, 1.4 mm long and rising 0.6 mm above callus. Outermost one mm of lip reflected

back over body whorl. Number of whorls, 5. Nuclear 1.5 whorls smooth; upper surface of succeeding whorls bearing weak growth lines, these becoming stronger on body whorl. Upper surface of whorls two and three bearing many short, slightly raised papillae, parallel to growth lines (see below). Lower shell surface generally smooth with some weak growth lines, these stronger near lip.

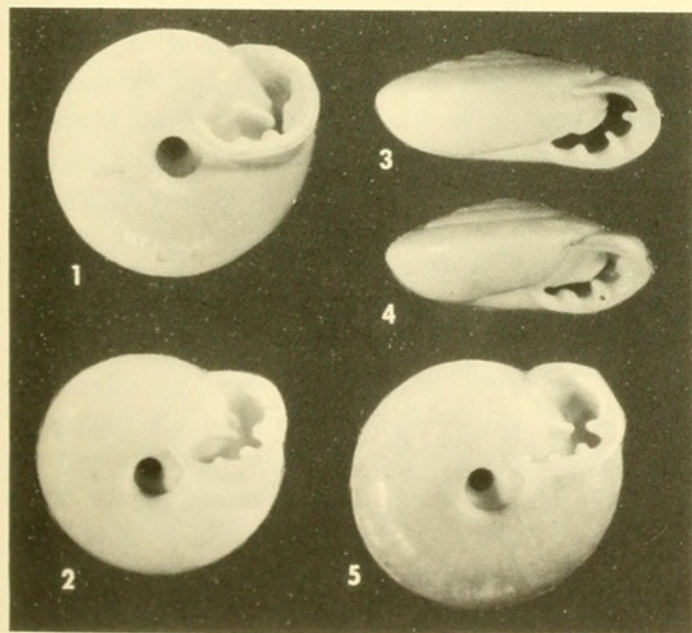
The papillae noted above seem to give evidence of the presence of cuticular scales on at least part of the dorsal surface of the shell in life. They greatly resemble those described by Clench and Miller (1966: 2) for *Ashmunella bequaerti*: "In older specimens where the scales have worn off, there remain raised hyphen-shaped papillae, parallel to the growth striae, giving a granular appearance to the surface."

This species is named in honor of Mr. Ray Watley, Texas Parks and Wildlife Department, who hospitably escorted us to and on the Sierra Diablo Wildlife Management Area, which contains the type locality (Locality 1, described hereafter).

Holotype, Delaware Museum of Natural History 118338. Paratypes: Dallas Museum of Natural History 5359; University of Texas at El Paso 3638, 4375 and 4978.

Variation: Only eight measurable paratypes were recovered from Loc. 1. For these the following measurements (in mm) and proportions were obtained (mean outside parenthesis; range inside parenthesis): Diameter: 12.94 (11.2-14.2); Height: 5.2 (4.75-5.6); Width of Umbilicus: 2.53 (2.1-2.9); Length of Lower Parietal Tooth: 2.26 (1.8-2.6); Length of Palatal Tooth: 1.64 (1.5-2.0); Number of Whorls: 4.99 (4.85-5.2); Diameter/Height: 2.44 (2.36-2.54); Diameter/Width of Umbilicus: 5.14 (4.48-6.14).

Among specimens from Loc. 1 there is little variation in shells. The sculpture of raised papillae is not observable on most of these shells probably because of exfoliation. The upper parietal denticle is barely discernible in some specimens. One specimen (11.2 mm in diameter), although seemingly mature, is notably smaller than the others and also exhibits stronger growth lines.



FIGS. 1-4. *Ashmunella watleyi* new species: 1, 4. Holotype (12.5 mm, diameter); 2, 3. Paratype (13.5 mm, diameter) from Loc. 3, Hueco Mts. 5. *Ashmunella carlsbadensis* Pilsbry (14.75 mm, diameter) from northern Sierra Diablo (mentioned in text).

Specimens from the Hueco Mountains (Locs. 2 and 3) have the size, shape and shell texture of *A. watleyi*. Minute papillae are barely discernible on the upper surface of the shell on whorls two and three. They differ slightly from specimens from Loc. 1 in denticulation, having a longer and higher upper parietal tooth and a more slender middle tooth in the outer lip (Figs. 2, 3). Similarities seem great enough to provisionally assign the few specimens from the Hueco Mountains to *A. watleyi*. Possibly *A. watleyi* is a species that occupied, at least during late Wisconsinan time, much of the escarpment that bounds the Diablo Plateau on the east, south and west. Few collections of Quaternary fossil gastropods have been made in this area, however.

COMPARISONS

Fullington has collected living *Ashmunella* in the northern part of the Sierra Diablo ca. 22 km north of Loc. 1, immediately south of Apache Canyon on the Puett Ranch. This species seems to be *A. carlsbadensis* Pilsbry, known otherwise from the Guadalupe and Delaware Mountains on the east side of Salt Basin. Shells of this species (Fig. 5) differ from those of *A. watleyi* in being thinner and relatively flatter. They are carinate rather than angular and the outer lip teeth are all relatively smaller, the palatal tooth being markedly narrow. *Ashmunella carlsbadensis* lacks cuticular scales, which seem likely to have been present in *A. watleyi*. *Humboldtiana ultima* Pilsbry, a land snail otherwise known only from the Guadalupe Mountains, also occurs with *A. carlsbadensis* in the northern Sierra Diablo.

Ashmunella watleyi is larger, more depressed and less ribbed than the fossil species, *Ashmunella nana* Metcalf and Fullington, from the Guadalupe Mountains. On the other hand, *A. watleyi* is smaller than the subspecies that have been ascribed to *A. kochii* Clapp from the Guadalupe and Cornudas Mountains. These latter species also have a broader umbilicus and lack the cuticular scales that were probably possessed by *A. watleyi*.

Cuticular scales are found in *A. pasonis* (Drake) of the Franklin Mountains, west of the Hueco Bolson and in *A. bequaerti* Clench

and Miller of the Davis Mountains, southeast of the Sierra Diablo. However, both these latter species are more depressed, more strongly keeled and have larger denticles than those of *A. watleyi*.

It is probable that *A. watleyi* and the other species mentioned above all belong to a group of *Ashmunellas* of the mountains of southern New Mexico and far western Texas that was referred to as the *Ashmunella mearnsi* group by Pilsbry (1940: 972) and Metcalf (1973: 39). However, affinities of *A. watleyi* within this group are not clear.

ASSOCIATED FAUNA AND PALEOECOLOGICAL IMPLICATIONS

In addition to *A. watleyi*, the following ten species of gastropods were found in the colluvium at Loc. 1: *Gastrocopta pellucida* (Pfeiffer), *G. pilsbryana* (Sterki), *Pupilla blandii* Morse, *P. sonora* (Sterki), *Vallonia perspectiva* Sterki, *Succinea* sp., *Vitrina pellucida alaskana* Dall, *Hawaiiia minuscula* (Binney), *Retinella* (*Glyphyalinia*) *indentata paucilirata* (Morelet) and *Euconulus fulvus* (Müller).

We searched for living gastropods on the steep east-facing scarp of the Sierra Diablo at two places on the Wildlife Management Area and found only *Gastrocopta pellucida* and *Retinella i. paucilirata*. It is likely, however, that *Hawaiiia minuscula* and the succineid also occur in the area. However, the remaining species found in the colluvium probably no longer occur in the range, although they do occur at higher, more mesic elevations in the Guadalupe Mountains, across Salt Basin to the northeast. Thus, a life zone depression is inferred, such as often has been discerned in regard to glacial-age faunas of the southwestern United States. It is deemed extremely likely, then, that the sediments were deposited during a glacial-equivalent time with colder temperatures and more effective moisture than at present. This is borne out by the nature of the sediments, containing, as they do, rock rubble of the kind produced by frost action and not being produced at these elevations today. As there has been relatively little subsequent deposition and as sediments are not indurated, it seems

likely that they were deposited no longer ago than during the late Wisconsinan (Woodfordian) Glaciation.

LOCALITIES OF COLLECTIONS

1. Texas, Culberson Co., 31° 17' 25" N; 104° 54' 47" W. Sierra Diablo Wildlife Management Area, Texas Parks and Wildlife Department. Upper end of main, south branch of Victoria Canyon on west wall of canyon, ca. 300 m east of Hudspeth-Culberson counties boundary along trail leading northward from Area headquarters buildings and 2.09 km north of these, 1660 m elevation. 12 September 1976.

2. Texas, Hudspeth Co., 31° 52' 21" N; 105° 59" W. Hueco Mts., on west slope of Alacran Mt., 3.5 km north of Hueco Inn. 1585 m. elev. Collected by Ronald Simpson, 7 March 1975.

3. Texas, El Paso Co., 31° 56' 30" N; 106° 00' 7" W. Hueco Mts., on east-facing hillslope, 4.2 km ENE of Hueco Tanks State Park Headquarters. 1478 m elev. 15 February 1973.

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MOLLUSKS WITH INDO-PACIFIC FAUNAL AFFINITIES IN THE EASTERN PACIFIC OCEAN

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ABSTRACT

Forty-one species of prosobranch gastropods and seven species of bivalves that have Indo-Pacific faunal affinities are recorded from the eastern Pacific Ocean. The vast majority of these taxa (79%) are known in eastern Pacific waters only from the offshore islands, namely: Clipperton (38 taxa), Revillagigedo (6 taxa), Cocos (4 taxa), Galapagos (9 taxa), and Guadalupe (1 taxon). Only 10 of these taxa are known to occur on the continental shelf of the west American Borderland, including the Tres Marias Islands. The fossil record provides little direct evidence to document the biogeography of this faunal element in the New World tropics.

A considerable amount of new zoogeographic and geologic data has become available since I presented a lecture on this subject to the Eleventh Pacific Science Congress at Tokyo, Japan, in 1966 (Emerson, 1967). The purpose of this paper is to update the list of the Indo-Pacific

molluscan species occurring in the tropical eastern Pacific and to review briefly the temporal significance of this faunal element in the New World tropics.

The presence of a minor element of the modern Indo-Pacific Faunal Province has been long



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