

HERPETOFAUNA OF THE PEDRO ARMENDARIZ LAVA FIELD, NEW MEXICO

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ABSTRACT

Notes on the distribution, relative abundance, habitat, and the relative degree of melanism are presented for 26 species of amphibians and reptiles collected at the Pedro Armendariz lava field, New Mexico. *Crotaphytus collaris*, *Sceloporus undulatus*, *Uta stansburiana*, *Phrynosoma cornutum*, *P. modestum*, *Crotalus atrox*, and *C. molossus* exhibited noticeable melanism. The 718 specimens analyzed represent the first comprehensive herpetofaunal study of the lava field.

INTRODUCTION

Three large basaltic lava fields occur in south-central New Mexico—the Tularosa malpais in Lincoln and Otero Counties, the Afton lava flows in Dona Ana County, and the Pedro Armendariz lava field in Socorro and Sierra Counties. Several authors (e.g., Dice 1929, 1930, 1942; Benson 1932, 1933; Bradt 1932; Dice and Blossom 1937; Burt 1939; Blair 1941, 1943; Lewis 1949; Shields and Crispin 1956) have investigated the biota of the Tularosa malpais. Lewis (1951), Prieto and Jacobson (1968), Koschmann (1972), and Elder (1977) have studied reptiles and mammals on the Afton flows. However, no biological investigations of the Pedro Armendariz lava field have been published.

The earliest account of collecting activities on the Pedro Armendariz lava field was that of Seth Benson of the University of California at Berkeley (unpublished); according to his field notes, Dr. Benson and his wife spent a few days there in July 1933. These field notes contain references to nearly black forms of *Phrynosoma*, *Crotalus*, and *Crotaphytus*, as well as dark forms of mammals such as *Peromyscus eremi-*

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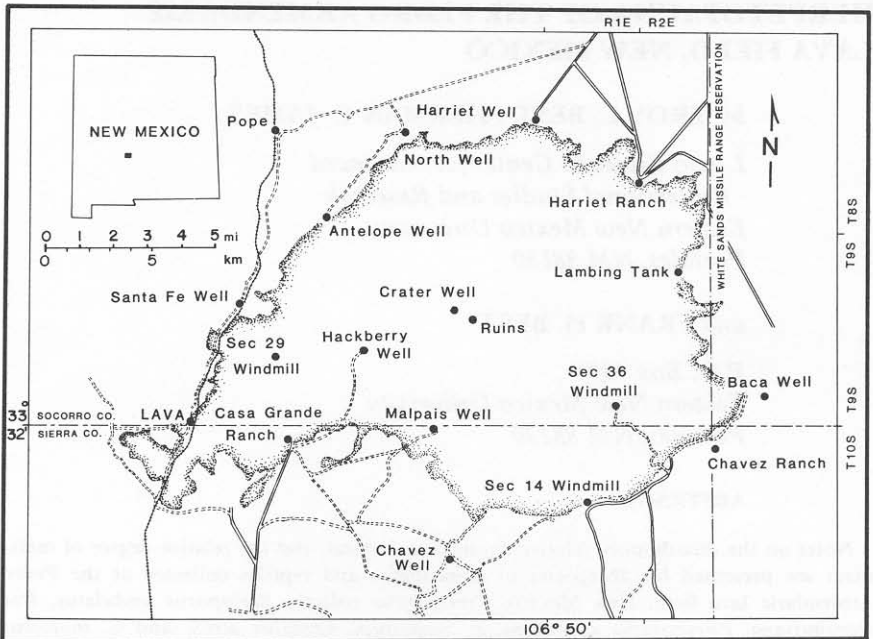


FIGURE 1. The Pedro Armendariz lava field, New Mexico.

cus and *Perognathus intermedius*. It was not until the late 1970s that additional collecting was done; mammals were collected by Melvin and Felecia Beard of Eastern New Mexico University under a contract with the New Mexico Department of Game and Fish.

Our study is the first comprehensive survey of the amphibians and reptiles of the Pedro Armendariz lava field. The purposes of our study were to determine which amphibian and reptile species occur on and near the lava field, the relative abundance of these, the habitats occupied by each, and the relative degree of melanism within the populations.

MATERIALS AND METHODS

A map of the Pedro Armendariz lava field, including place names mentioned in the text, is presented in Figure 1. The age of the field is approximately 760,000 years (Bachman and Mehnert 1978). It is 15 to 20 km in diameter, and there is a large crater near its center (elevation 1,566 m). The lava abruptly meets the plains on all sides. However, on the west and southwest sides there is a great deal of sandy soil on the lava. The edge of the lava is 3 to 5 m high and rises gradually toward the crater in a series of low hills. Between the low hills are soil-filled flats that hold water following heavy rains (Dr. S. Altenbach, Univer-

sity of New Mexico, Albuquerque, pers. comm. 1982). The soil here is mostly sandy although there is enough clay to make passage of vehicles difficult after rain showers. The surface of the lava field consists of broken pieces of lava embedded in soil. Much of the field is well vegetated with shrubs and grasses. Small lava pebbles form desert pavement between shrubs in many areas. The mosaic of lava and soil areas is extensive, especially near the edges of the lava field, and extends into the crater itself.

During April, July, and August of 1981 and May and June of 1982, 718 specimens of amphibians and reptiles were collected on or within 300 m of the lava field. Specimens were collected by hand, by rubber bands (launched ballistically from the collector's finger), and with .22 caliber no. 12 shot. All specimens were preserved in 10% formalin in the field, stored in 40% isopropyl alcohol, and permanently deposited in the Eastern New Mexico University Natural History Museum.

Although we might have been more successful in capturing some species had rocks been overturned systematically, rock-turning was avoided to minimize disturbance of the lava habitat. Unless stated, the species listed below did not exhibit melanism.

ACCOUNTS OF SPECIES

AMBYSTOMIDAE, Mole Salamanders

Ambystoma tigrinum, Tiger Salamander

Specimen examined, 1—Socorro Co.: Antelope Well. Sight records—Socorro Co.: Lambing Tank. Sierra Co.: Malpais Well. Remarks—Tiger salamanders (larvae and adults) occurred regularly in small numbers in earthen stock tanks. All specimens were observed at night.

PELOBATIDAE, Spadefoot Toads

Scaphiopus couchi, Couch's Spadefoot

Specimens examined, 12—Socorro Co.: Lambing Tank. Remarks—Couch's spadefoots were locally abundant at only one of the four temporary rainwater ponds where we collected in August 1981.

Scaphiopus multiplicatus, Western Spadefoot

Specimens examined, 32—Socorro Co.: Harriet Well; North Well; Lambing Tank; T9S R2E NE 1/4 Sec 20; Sec 29 Windmill. Sierra Co.: Chavez Ranch. Remarks—We have followed Brown (1976) in assigning the species name to this taxon. Western spadefoots occurred regularly in small numbers at earthen stock tanks and abundantly in temporary rainwater ponds.

Scaphiopus bombifrons, Plains Spadefoot

Specimens examined, 21—Socorro Co.: Harriet Well; Lambing Tank; T9S R2E NE 1/4 Sec 20. Remarks—These spadefoots were locally

abundant following heavy rains, and were found in three of the four temporary rainwater ponds where we collected in August 1981.

BUFONIDAE, Toads

Bufo cognatus, Great Plains Toad

Specimens examined, 26—Socorro Co.: North Well; 2.4 km (1.5 mi) S North Well; Antelope Well; T9S R2E NE 1/4 Sec 20; Sec 29 Windmill. Sierra Co.: Malpais Well; Chavez Ranch. Remarks—The Great Plains toad occurred regularly in small numbers at earthen stock tanks and temporary rainwater ponds throughout the region. One specimen was found under a 20 cm diameter lava boulder 2.4 km (1.5 mi) south of North Well, the nearest water. The soil under the rock was moist from a recent rain. This was the only specimen of *Bufo* or *Scaphiophus* actually collected on the lava field proper.

Bufo debilis, Green Toad

Specimens examined, 12—Socorro Co.: Lambing Tank; T9S R2E NE 1/4 Sec 20. Remarks—Green toads were locally abundant following heavy rains, and were found in two of four temporary rainwater ponds in August 1981.

TESTUDINIDAE, Box and Water Turtles, Tortoises

Terrapene ornata, Box Turtle

Specimens examined, 13—Socorro Co.: North Well; 0.8 km (0.5 mi) W Antelope Well; Antelope Well; 7.7 km (4.8 mi) NE Lava; Santa Fe Well; 4.2 km (2.6 mi) S Hackberry Well; 1.9 km (1.2 mi) SW Baca Well; Lava. Sierra Co.: 1.0 km (0.6 mi) NE Casa Grande Ranch; Malpais Well; 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14; 3.2 km (2 mi) N Chavez Well. Remarks—Box turtles were common, especially in sand-filled lava areas on the south and west side of the lava field. They were present on the lava field proper in smaller numbers, and were most common in periods following rainfall. During late May and early June 1982, when it was very dry, no box turtles were observed.

IGUANIDAE, Iguanid Lizards

Holbrookia maculata, Lesser Earless Lizard

Specimens examined, 34—Socorro Co.: Harriet Well; 2.4 km (1.5 mi) S North Well; Antelope Well; Lambing Tank; 0.6 km (0.4 mi) N Malpais Well; Lava. Sierra Co.: Malpais Well; 1.0 km (0.6 mi) NE Casa Grande Ranch; 6.4 km (4 mi) SW Casa Grande Ranch; 2.9 km (1.8 mi) SW Casa Grande Ranch; 4.8 km (3 mi) SW Casa Grande Ranch; 3.2 km (2 mi) N Chavez Well. Remarks—Individuals of this species were locally abundant near the edge of the lava field, but were not common on the lava field proper. They preferred sandy soils with sparse vegeta-

tion, and were often observed at entrances to banner-tailed kangaroo rat (*Dipodomys spectabilis*) burrows. Within the lava field, lesser earless lizards were found only on the flat, sandy-soiled areas. They were most active during the warmest part of the day.

Crotaphytus collaris, Collared Lizard

Specimens examined, 145—Socorro Co.: Harriet Well; 0.8 km (0.5 mi) W North Well; 2.4 km (1.5 mi) S North Well; 2.9 km (1.8 mi) SW North Well; Antelope Well; T9S R1E NE 1/4 Sec 1; T9S R2E N 1/2 Sec 5; Lambing Tank; Santa Fe Well; 0.2 km (0.1 mi) SE Crater Well; Ruins, 1.1 km (0.7 mi) SE Crater Well, 1.6 km (1 mi) SW Crater Well; 1.9 km (1.2 mi) SW Crater well; 3.1 km (1.9 mi) NE Hackberry Well; 2.4 km (1.5 mi) NE Hackberry Well; 1.8 km (1.1 mi) NE Hackberry Well; 2.1 km (1.3 mi) E Hackberry Well; 2.9 km (1.8 mi) E. Hackberry Well; Hackberry Well; Sec 29 Windmill; 1.1 km (0.7 mi) SE Hackberry Well; 1.4 km (0.9 mi) SE Hackberry Well; 3.1 km (1.9 mi) SSW Hackberry Well; 7.6 km (4.7 mi) SSW Hackberry Well; 50.7 km (31.5 mi) N, 18.5 km (11.5 mi) E Engle; T9S R2E S 1/2 Sec 19; T9S R2E N 1/2 Sec 29; T9S R2E N 1/2 Sec 33; 1.9 km (1.2 mi) SW Baca Well; Sec 36 Windmill; 3.9 km (2.4 mi) NNW Malpais Well; 3.4 km (2.1 mi) NNW Malpais Well; 3.2 km (2 mi) NNW Malpais Well; 3.1 km (1.9 mi) NNW Malpais Well; 2.9 km (1.8 mi) NNW Malpais Well; 0.6 km (0.4 mi) N Malpais Well; Lava. Sierra Co.: 1.9 km (1.2 mi) E Casa Grande Ranch; T10S R2E NW 1/4 Sec 6; T10S R2E SW 1/4 Sec 6; T10S R2E SE 1/4 Sec 6; T10S R2E NW 1/4 Sec 7; 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14; 6.4 km (4 mi) SW Casa Grande Ranch; T10S R1E W 1/2 Sec 15; 3.2 km (2 mi) N Chavez Well. Remarks—The collared lizard was probably the most abundant reptile on the lava field; most lava outcrops had one or more individuals present. Collared lizards also were found perched in tops of *Rhus* and *Atriplex*, and on man-made objects such as cement blocks, corrals, and old boards. This species was restricted mostly to the lava field, although specimens were collected 50 to 80 m from the lava border. They were most active during the warmest part of the day. Specimens ranged from almost black dorsally to pale green. The majority of specimens was dark and many were approximately the same color as the lava. Ventrally, all specimens were pale.

Crotaphytus wislizenii, Leopard Lizard

Specimens examined, 7—Socorro Co.: Antelope Well; Santa Fe Well. Sierra Co.: 1.9 km (1.2 mi) E Casa Grande Ranch; Malpais Well; 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14. Remarks—Leopard lizards were not common. They seemed to prefer sandy soils and were most active during the warmest portion of the day. This spe-

cies was never found on the lava field, but was collected within 20 m of lava at all localities.

Sceloporus undulatus, Fence Lizard

Specimens examined, 13—Socorro Co.: Harriet Well; T9S R2E N 1/2 Sec 5. Sierra Co.: 3.2 km (2 mi) N Chavez Well. Remarks—These lizards were found in only three localities. Fence lizards were common on the sides and tops of large lava boulders at the Harriet Well and Chavez Well sites, and their absence at other localities is puzzling. Although specimens at the lava field were all found on or near the lava, one specimen was collected from the top of a fence post in a sandy soiled area several miles north of the lava field (Socorro Co., T7S R2E SW 1/4 Sec 21). Specimens from the lava field were dark. However, the two light colored dorsolateral stripes were visible.

Uta stansburiana, Side-blotched Lizard

Specimens examined, 185—Socorro Co.: Harriet Well; North Well; 2.1 km (1.3 mi) SW North Well; 2.4 km (1.5 mi) S North Well; 2.1 km (1.3 mi) N Harriet Ranch Hdqts.; T9S R2E N 1/2 Sec 5; Antelope Well; Santa Fe Well; Lava; Malpais Well. Sierra Co.: 1.9 km (1.2 mi) E Casa Grande Ranch; Malpais Well; 2.9 km (1.8 mi) SW Casa Grande Ranch; 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14; 6.4 km (4 mi) SW Casa Grande Ranch; 3.2 km (2 mi) N Chavez Well. Remarks—Side-blotched lizards were locally abundant, especially in areas with considerable sand on the lava. The area on the east side of the lava field had relatively little sand, and no *U. stansburiana* was collected there. Since *U. stansburiana* is relatively dark colored, it was difficult to assess the degree of melanism in this species. Specimens exhibited some melanism, but were extremely variable. In collecting specimens we qualitatively observed that darker specimens came from areas with less sand on the lava, and vice versa. We believe this species would be valuable in studying color variation between populations occurring on and off the lava field.

Phrynosoma cornutum, Texas Horned Lizard

Specimens examined, 7—Socorro Co.: 2.4 km (1.5 mi) S North Well; 0.8 km (0.5 mi) W Antelope Well; Santa Fe Well; Sec 29 Windmill; Lava. Sierra Co.: 3.2 km (2 mi) S Lava. Sight record—Socorro Co.: 2.1 km (1.3 mi) N Harriet Ranch Hdqts. (eviscerated and mummified body on *Rhus*; not saved). Remarks—Texas horned lizards were common only on the west and northwest portions of the lava field in both lava and sand covered areas. The species seemed most common on sandy sites, and many were observed in sandy habitat north of the lava field. Some of the specimens exhibited a slight degree of melanism.

Phrynosoma modestum, Round-tailed Horned Lizard

Specimens examined, 15—Socorro Co.: Harriet Well; 2.4 km (1.5 mi) S North Well; T9S R1E NE 1/4 Sec 1; Antelope Well; T9S R2E N 1/2 Sec 5; Hackberry Well; Sec 29 Windmill; 41.0 km (25.5 mi) N, 8.9 km (5.5 mi) E Engle; 1.9 km (1.2 mi) SW Baca Well. Sierra Co.: 6.4 km (4 mi) SW Casa Grande Ranch; 3.2 km (2 mi) N Chavez Well. Sight record—Sierra Co.: 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14 (eviscerated and mummified body on *Prosopis*; not saved). Remarks—This was one of the most abundant reptiles on the lava field proper. It occupied lava flats and sandy flats next to lava outcrops. Some specimens were nearly black and others were paler, but all of them exhibited some melanism.

TEIIDAE, Whiptails

Cnemidophorus neomexicanus, New Mexico Whiptail

Specimens examined, 48—Socorro Co.: Harriet Well; North Well; 2.1 km (1.3 mi) N Harriet Ranch Hdqts.; 2.4 km (1.5 mi) S North Well; Antelope Well; 2.3 km (1.4 mi) NNE Santa Fe Well; Santa Fe Well; T9S R2E N 1/2 Sec 29; 1.9 km (1.2 mi) SW Baca Well; Lava. Sierra Co.: 1.9 km (1.2 mi) E Casa Grande Ranch; T10S R2E NW 1/4 Sec 7; 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14; 4.8 km (3 mi) SSW Lava; 6.4 km (4 mi) SW Casa Grande Ranch. Remarks—New Mexico whiptails were most abundant on the extreme north side of the lava field near Harriet Well and North Well. The species was common throughout the rest of the region, but in lesser numbers. It occurred on both lava and soiled sites, but seemed to prefer soil-covered areas.

Cnemidophorus inornatus, Seven-striped Whiptail

Specimens examined, 62—Socorro Co.: Harriet Well; North Well; 2.1 km (1.3 mi) N Harriet Ranch Hdqts.; 2.4 km (1.5 mi) S North Well; T9S R1E NE 1/4 Sec 1; Antelope Well; T9S R2E N 1/2 Sec 5; Lambing Tank; Santa Fe Well; Hackberry Well; Sec 29 Windmill; 2.3 km (1.4 mi) SW Hackberry Well; 5.3 km (3.3 mi) SW Hackberry Well. Sierra Co.: Malpais Well; T10S R2E SE 1/4 Sec 6; T10S R2E NW 1/4 Sec 7; 2.9 km (1.8 mi) SW Casa Grande Ranch; 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14; 6.4 km (4 mi) SW Casa Grande Ranch; 3.2 km (2 mi) N Chavez Well. Remarks—This lizard was one of the most common species on the lava field; it was also common in adjacent areas.

Cnemidophorus tigris, Marbled Whiptail

Specimens examined, 2—Socorro Co.: 2.1 km (1.3 mi) N Harriet Ranch Hdqts.; Santa Fe Well. Remarks—Marbled whiptails were rare, and were never found on the lava field. The specimen from near Harriet Ranch was collected on top of a banner-tailed kangaroo rat mound,

near some broomweed (*Xanthocephalum*) and grass; the substrate was sandy with desert pavement of caliche and lava. The Santa Fe Well specimen was collected in creosote bush (*Larrea*) habitat north of the lava field, again with caliche desert pavement.

Cnemidophorus tessellatus, Checkered Whiptail

Specimens examined, 51—Socorro Co.: Harriet Well; 2.1 km (1.3 mi) N Harriet Ranch Hdqts.; 2.4 km (1.5 mi) S North Well; Lambing Tank; Santa Fe Well; Hackberry Well; T9S R2E N 1/2 Sec 29; Sec 36 Windmill; 1.9 km (1.2 mi) SW Baca Well; Malpais Well. Sierra Co.: 1.9 km (1.2 mi) E Casa Grande Ranch; Malpais Well; T10S R2E SE 1/4 Sec 6; T10S R2E NW 1/4 Sec 7; 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14; 3.2 km (2 mi) N Chavez Well. Remarks—This species was common, especially on soil-covered areas in and near the lava field. It seemed to prefer areas with sand and at least some lava nearby, but several were collected on sandy soils away from the lava.

COLUBRIDAE, Colubrid Snakes

Sonora semiannulata, Ground Snake

Specimens examined, 2—Socorro Co.: T9S R2E N 1/2 Sec 33. Sierra Co.: T10S R2E NW 1/4 Sec 7. Remarks—Because we elected not to systematically overturn rocks, this species may have been more common than was indicated by our observations. One specimen was collected from under a 20 cm diameter lava rock on a lava outcrop; the other was collected as it crawled across the desert pavement on a soil-filled lava flat.

Heterodon nasicus, Western Hognose Snake

Specimen examined, 1—Socorro Co.: North Well. Remarks—These snakes are common in the general region, but they probably are not abundant on the lava field. Our specimen was collected as it crawled along the cement base of the large stock tank at North Well.

Masticophis flagellum, Coachwhip

Specimens examined, 5—Socorro Co.: North Well; 2.1 km (1.3 mi) N Harriet Ranch Hdqts.; 2.4 km (1.5 mi) S North Well. Sierra Co.: 4.0 km (2.5 mi) SW Casa Grande Ranch; T10S R1E NE 1/4 Sec 13. Remarks—Coachwhips were common on the lava field and throughout the region. They seemed to prefer sandy-soiled areas.

Pituophis melanoleucus, Gopher Snake

Specimens examined, 3—Socorro Co.: 0.8 km (0.5 mi) W Antelope Well. Sierra Co.: Malpais Well; T10S R2E NW 1/4 Sec 7. Remarks—Gopher snakes were common on the lava field and throughout the region.

VIPERIDAE, Pit Vipers

Crotalus atrox, Western Diamondback Rattlesnake

Specimens examined, 14—Socorro Co.: Harriet Well; 2.1 km (1.3 mi) N Harriet Ranch Hdqts.; Hackberry Well; T9S R2E N 1/2 Sec 33; Sec 29 Windmill; 41.0 km (25.5 mi) N, 8.9 km (5.5 mi) E Engle; Sec 36 Windmill. Sierra Co.: 0.5 km (0.3 mi) NW Windmill, T10S R1E NW 1/4 Sec 14. Remarks—This is probably the most common snake species on the lava field. Lava outcrops and soil-covered areas next to lava were preferred, but some western diamondbacks occurred in adjacent sandy areas at dusk. All specimens exhibited melanism. The variation ranged from nearly black to moderately dusky. The diamond-shaped dorsal markings were visible on all specimens. Often the ventral sides were pinkish rather than cream colored.

Crotalus molossus, Black-tailed Rattlesnake

Specimen examined, 1—Socorro Co.: 50.7 km (31.5 mi) N, 18.5 km (11.5 mi) E Engle (=Ruins). Remarks—Our specimen was coiled in a rockpile in the mining ruins near the center of the lava field, and was darker than those examined from adjacent areas in New Mexico.

Crotalus viridis, Prairie Rattlesnake

Specimens examined, 6—Socorro Co.: Harriet Well; Antelope Well; Santa Fe Well; T9S R2E NE 1/4 Sec 20; Lava. Remarks—Prairie rattlesnakes were common, especially on sandy areas, throughout the region. They preferred sandy soils away from the lava, but the specimen from Antelope Well was collected from the top of a large lava outcrop where it was coiled on the sand in a lava crevice.

MELANISM IN REPTILES FROM NEW MEXICO LAVA FLOWS

Coloration of reptiles on New Mexico lava fields has received little attention. Lewis (1949) briefly reported on the coloration of reptiles from the Tularosa malpais, and Lewis (1951) and Prieto and Jacobson (1968) provided comments on specimens they collected on the Afton lava flows. These studies provide a basis for comparisons of coloration between the three southern New Mexico lava fields.

We observed some degree of melanism in seven reptile species on the Pedro Armendariz lava field; these were *Crotaphytus collaris*, *Sceloporus undulatus*, *Uta stansburiana*, *Phrynosoma cornutum*, *P. modestum*, *Crotalus atrox*, and *C. molossus*. Of these species, Lewis (1951) collected *U. stansburiana* and *C. collaris* on the Afton lava flows and also found them to be melanistic. However, his *C. atrox* was not melanistic. Prieto and Jacobson (1968) subsequently collected additional non-melanistic specimens of *C. atrox* from the Afton lava flows, but their *C. molossus* were melanistic. For the Tularosa malpais, Lewis (1949) col-

lected specimens of *U. stansburiana*, *S. undulatus*, *C. collaris*, and *C. molossus*; all exhibited melanism. Thus, *C. collaris*, *U. stansburiana*, and *C. molossus* were darker on all three fields, *S. undulatus* was darker on both lava fields where they occurred (the Pedro Armendariz field and the Tularosa malpais), and the only darkly pigmented populations of *P. cornutum*, *P. modestum*, and *C. atrox* were on the Pedro Armendariz field.

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