A NEW SPECIES OF COLLARED LIZARD
(IGUANIA: CROTAPHYTIIDAE) FROM
NORTHEASTERN BAJA CALIFORNIA, MÉXICO

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ABSTRACT: A new species of collared lizard, *Crotaphytus grismeri*, is described from the isolated Sierra de Los Cucapá and contiguous Sierra El Mayor, Baja California, Mexico. This species is distinguished from all other *Crotaphytus* by its small adult size, green pigmentation within the pale bar separating the anterior and posterior collars, a dull orange colored tail and hind limbs in subadult females, a unique hind limb color pattern, and a well demarcated, pale tan dorsal caudal stripe in juveniles of both sexes.

Key words: Crotaphytidae; *Crotaphytus grismeri*; Sierra de Los Cucapas; Baja California; New species

The genus *Crotaphytus*, as it is currently constituted, includes six species of relatively large, predaceous lizards, well known for their pugnacious habits and bipedal gait. Most of the species are strongly saxicolous and are nearly always restricted to rocky hillsides, outcappings, and alluvial fans with sparse vegetation. The collective distribution of the genus includes most of the arid western United States and northern México, with two species, *C. vestigium* and *C. insularis*, restricted to the Peninsular Ranges of Baja California and Isla Angel de la Guarda in the Gulf of California, respectively.

During the course of a phylogenetic analysis of the iguanian lizard family Crotaphytidae, a distinctive new species of *Crotaphytus* was discovered in the Sierra de Los Cucapás and contiguous Sierra El Mayor in northeastern Baja California, México. Ten specimens were collected and this series, together with photographs of living individuals in their natural habitat, provide the basis for the description which follows. The Sierra de Los Cucapás and Sierra El Mayor are well isolated from the nearby Peninsular Ranges, thus it is not surprising that this population of collared lizards exhibits a number of distinctive characteristics that set it apart from all other species of *Crotaphytus*. This population apparently was first discovered by Edward Goldman, who collected a specimen (USNM 37625) on 19 April 1905, during the course of one of his many biological investigations of Baja California.

MATERIALS AND METHODS

Scale counts, measurements, and color pattern in alcohol are based on 10 specimens deposited in the collections of Universidad Autonoma de Baja California (Ensenada) and Centro Ecologico de Sonora. A total of 410 specimens of other species of *Crotaphytus* were examined for comparison. Museum numbers are given in Appendix I and museum acronyms are provided in the acknowledgments. Following the discovery of this population in 1990, several visits to the type locality were made in order to photograph and take notes on living individuals and their habitat. Scale terminology follows Smith (1946) and neck fold terminology follows Frost (1992), where appropriate. Descriptions of the holotype and variation are given in some detail because of the likelihood that additional material may not become available in the foreseeable future.

The taxonomy of *Crotaphytus* was recently modified by Collins (1991), who elevated *C. insularis* and *C. vestigium* to full species status without providing data in support of his decision. Although I disagree with such unsupported changes in principle, my own unpublished data also support their recognition as distinct spe-
Fig. 1.—(A) Adult male Crotaphytus grissomii. (B) Subadult female C. grissomii. Note orange coloration of the hind limbs and tail and the black lateral spots bordered in white. (C) Gravid female C. grissomii. (D) Adult male C. ceratium.
cies. Therefore, rather than producing yet another taxonomic change that would inevitably be necessary in the near future, the taxonomy of Collins (1991) is followed here.

*Crotaphytus grismeri* sp. nov.

*Suggested common name.*—Sierra de Los Cucañas collared lizard.

**Holotype.**—(CES 067-629), adult male collected by Jimmy A. McGuire on 10 April 1993 from Cañón David, a low pass that separates the contiguous Sierra de Los Cucañas and Sierra El Mayor, approximately 2 km W. Mex. Hwy. 5 on the dirt road to the sulfur mine (turnoff at KM 49 S. Mexican), Baja California, México.

**Paratypes.**—(CES 067-624–25, 067-627–28; UABC 115-19; USNM 37625), collected by Jimmy A. McGuire and L. Lee Grismer on 10 April 1993 at the type locality.

**Etymology.**—It is with great pleasure that I name this species in honor of my good friend L. Lee Grismer, not only for introducing me to the science of herpetology, but more importantly, in recognition of his outstanding contributions to our knowledge of the herpetofauna of the Baja California peninsula and its associated islands.

**Diagnosis.**—*Crotaphytus grismeri* differs from all other *Crotaphytus* in the presence of a dull orange colored tail and hind limbs in subadult females (Fig. 1B), green pigmentation within the pale gray or white bar that separates the anterior and posterior black collars, a well defined pale tan dorsal caudal stripe in juveniles of both sexes, a hind limb pattern wherein the region between the middle of the thigh and its distal extremity is yellow and unmarked except for scattered minute brown spots, and in its small adult size (maximum male snout–vent length [SVL] = 99 mm, n = 7; $x = 93.3$). The presence in subadult females ($n = 6$, including photographs of living individuals) of three large, lateral black spots with bold white borders (Fig. 1B,C) may represent another diagnostic feature. *Crotaphytus grismeri* is further distinguished from *C. reticulatus* and the five currently recognized subspecies of *C. collaris* (collaris, baileyi, auriceps, fuscus, and nebritus) by the presence, in adult males, of large black or dark brown inguinal patches, a strongly laterally compressed tail, and a bold white dorsal caudal stripe. It differs from these species and from *C. dickersonae* in that it lacks (in both sexes) black pigmentation of the oral mucosa and in the dark brown dorsal ground color of adult males. It differs from the remaining *Crotaphytus* (*C. bicinctores, C. insularis,* and *C. vestigium*) in that the dorsal surface of the forelimb is yellow and almost without pattern, except for a small patch of minute brown spots near the forelimb insertion. It differs further from *C. insularis* and *C. vestigium* in that the posterior collar is only narrowly incomplete middorsally rather than broadly incomplete and in having a dorsal pattern of subequal white spots without transversely oriented white bars. The diagnostic characters of *C. grismeri* are compared with other forms of *Crotaphytus* in Table 1.

**Description of holotype.**—Adult male SVL 93 mm. Dorsal cephalic scales smooth, convex, polygonal, with numerous inconspicuous surface irregularities. Rostral approximately two times wider than high, roughly pentagonal in shape due to slightly elevated middorsal margin; a small incompletely separated scale present at left margin. Rostral bordered by four postrostrals, medial pair slightly larger than lateral scales. Remaining rostral scales irregularly arranged, with one complete row of seven scales and an incomplete row separating postrostrals from internasals. Internasals in three irregular transverse rows, anterior two with six scales each, posterior row with seven. Each nasal forms a thin-walled ring, pierced centrally by external nare; nares face laterally at a slight dorsal angle. Three median frontonasals, anterior two, 4–6 times larger than adjacent internasals; a small, posterior, median frontonasal at junction of supraorbital semicircles; median frontonasals flanked by anteriorly diverging rows of six scales each. Three canthals, posteriormost wider than high, anterior two as wide as high; seven scales separate right and left posterior canthals; canthus rostralis prominent. Ten scales be-
tween rostral and juncture of right and left supraorbital semicircles. Supraorbital semicircles distinct, but asymmetric; a single azygous frontal, preceded by five semicircle scales on each side, followed by seven semicircle scales on left, followed by several small, deformed scales, possibly due to injury, on right. At least two frontoparietals, others possibly obscured by deformation of several scales of right supraorbital semicircle. Interparietal small, asymmetrical, about twice as long as wide, with opalescent “eye” present slightly posterolateral to center. Seven scales between posterior edge of parietal shelf and interparietal. Parietals generally small and irregular, those of supraorbital semicircles, and those bordering semicircles medially, about 2–4 times larger than more medial scales between interparietal and posterior edge of parietal shelf. A small median scale immediately posterior to interparietal. Supraoculars small, flat, smooth, becoming progressively larger medially such that smallest medial scales are 2–4 times larger than lateral scales. Transverse scale counts across widest part of orbital regions 9–9. Circumorbitals not well differentiated from supraoculars. Superciliaries 11–12, elongate; anterior five with oblique sutures oriented posterodorsally, posterior four with oblique sutures oriented anterodorsally. Palpebrals ovoid, slightly convex, interspersed with numerous interstitial granules, a row of slightly enlarged palpebrals separated from ciliaries by granular scales. Inner ciliaries rectangular, deeper than wide, outer ciliaries of upper eyelid projecting, anterior and posterior ciliaries projecting slightly further than those medially; outer ciliaries of lower eyelid larger than those of upper eyelid, strongly projecting, conical, with anterior and posterior scales projecting slightly further than those medially. Preoculars, suboculars, and postoculars form an arc of 7–8 rectangular scales, all with strong superior keel, strongly concave below keel; large posteriormost
postocular present on left side, absent on right. Supralabials 16-17, all slightly longer than high except anteriormost scale, which is square. Supralabials followed posteriorly by 5-3 elongate postlabials. Lorilabials in 2-3 rows, rectangular, juxtaposed, separating supralabials from suboculars and nasals. Loreals small, numerous, in 5-4 rows, largest bordering suboculars and canthals (superior most loreal largest). Lower temporals small, convex, oval, often separated by interstitial granules; zone of less convex, polygonal, juxtaposed scales about two times larger than bordering upper and lower temporals, corresponding to underlying postorbital bones, extending posteriorly from postoculares to approximately seven scales anterior to external auditory meatus. Upper temporals more strongly convex than lower temporals. Aperture of external auditory meatus rectangular, approximately four times higher than wide, with small, strongly convex, somewhat conical auricular scales lining anterior margin. Mental pentagonal, 1.5 times wider than high, slightly wider than rostral, bordered laterally by anterior infralabials and sublabials and posteriorly by a pair of large postmentals. Postmentals separated from infralabials by sublabials. Chinshields weakly differentiated, first three larger than surrounding scales, anterior pair separated by a pair of large scales. Infracanines 16-18, square, with only a few wider than high; inferior border convex. Gulars granular, strongly convex, beadlike, each scale separated from adjacent scales by numerous asymmetrically arranged interstitial granules. Gulars flattened and discoid in gular pouch region. Gulars within symphysial groove much smaller than surrounding scales that overlies mandibles.

Dorsal scales of neck and body very small, rounded, strongly convex, nonimbricate, each characteristically surrounded by six granules giving appearance of a six-pointed star. Median dorsal scales posterior to anterior collar 1.5-2 times larger than lateral dorsal scales. Dorsals grade smoothly into ventrals, approximately 199 rows encircle body midway between forelimb and hind limb insertions. Fifty-eight dor-

sals between interparietal and anterior edge of posterior collar. Ventrals smooth, flat, varying from oval anteriorly to rhombic posteriorly, approximately 3-4 times larger than adjacent laterals, occasionally slightly imbricate.

A complex series of neck and gular folds present. Antehumeral fold strongly developed, forming a deep suprahumeral dermal mite pocket, continuous with transverse gular fold enclosing minute scales. Anterior to antehumeral fold, an oblique neck fold branches into two folds as it approaches posterior edge of mandible. Well developed postauricular fold extends from near superior apex of external auditory meatus to posteroventral aspect of the mandible, where it is met by anterior branch of oblique neck fold. It then turns posteriorly, joins posterior branch of oblique neck fold, then turns ventrally, and merges with convoluted gular folding. One of the folds it meets is a well developed antegular fold, which lacks smaller scales. The most anterior vertical neck fold extends posterodorsally from postauricular fold from a point ½ the way up from ventral margin of external auditory meatus. It projects dorsally and slightly posteriorly to a point nearly equidistant with dorsal extent of anterior collar. What may represent a longitudinal neck fold connects first vertical neck fold with oblique neck fold. This fold is more evident on left side than right. Where folds meet, a second vertical neck fold (also more visible on left side of specimen) originates and projects at roughly same angle as first vertical neck fold until contacting a third vertical neck fold. Third vertical neck fold branches from antehumeral fold, crosses oblique neck fold, and extends anterodorsally along anterior collar almost reaching its dorsal terminus. A fourth vertical neck fold branches from antehumeral fold and extends approximately ½ the way up posterior collar. Several longitudinal folds extend posteriorly from fourth vertical neck fold to approximately mid-trunk.

Tail slit down ventral midline; anterior one-half strongly compressed laterally, 2.4 times higher than wide at highest point (33 mm posterior to vent), posterior one-
half oval in cross-section. Tail long, tail length/total length = 0.66. At mid-sacrum, caudal scales square to slightly rectangular; caudals slightly imbricate, mucronate, and weakly keeled just anterior to midpoint of tail; caudals obviously imbricate, more distinctly keeled (but not acutely) near distal caudal extremity. Dorsal caudals of proximal, strongly compressed region of tail 1.5–2 times larger than adjacent lateral scales. Paired, median row of subcaudals 2–3 times larger than adjacent subcaudals and lateral caudals; posteriorly, subcaudals become progressively more distinctly keeled and mucronate. Enlarged postanal scales eight, scales between postanal plates and vent much smaller than remaining subcaudals.

Scales in immediate vicinity of forelimb insertion minute, except for a patch of extremely large, discoid scales at anterior forelimb insertion. Suprabrachials discoid, separated by interstitial granules, becoming larger and slightly imbricate distally; distal suprabrachials approximately two times larger than dorsal body scales. Suprabrachials grade smoothly into smaller postbrachials; postbrachials more convex ventrally. Prebrachials convex, beadlike, each surrounded by six symmetrically arranged interstitial granules; prebrachials grade abruptly into smaller, convex infrabrachials. Supra-antebrachials; preantebrachials, and postantebrachials small, discoid, non-overlapping proximally; much larger and strongly imbricate adjacent to supracarpals. Infra-antebrachials convex, much smaller than adjacent pre- and postantebrachials. Supracarpals large, strongly imbricate, continuous with large supradigital scales. Proximal supradigitals wider than long. Infracarpals strongly imbricate, each with three strong mucrons. Subdigital lamellae moderately imbricate, each with 3–5 short mucrons.

Deep postfemoral dermal mite pocket present at hind limb insertion. Suprafemorals small, convex, nearly equal in size to lateral dorsals, separated by numerous interstitial granules, grading into prefemorals, which become more discoid, slightly imbricate, and larger distally; prefemorals at knee much larger than surrounding scales, 5–10 times larger than suprafemorals. Prefemorals grade into smaller, more convex infrafemorals, terminating at femoral pore series; 21-20 pale femoral pores, separated medially by 25 granular scales. Suprafemorals grade smoothly into minute, convex, oblong postfemorals, interspersed with interstitial granules. Supratibials small, convex, grading into larger, flattened, juxtaposed posttibials and larger, similarly shaped pretibials; pretibials granular where adjacent to supratarsals. Infratibials smooth, flat, juxtaposed proximally, becoming imbricate distally, much larger than adjacent pre- and posttibials. Supratarsals large, imbricate anteriorly, slightly convex, granular posteriorly. Infratarsals strongly imbricate, 1–3 keels per scale. Supradigital scales smooth, large, strongly imbricate. Subdigital scales imbricate, with 3–7 keels, each with a terminal mucron; subdigital lamellae on fourth toe 19-19.

Color pattern of holotype in alcohol.—Dorsal surface of head golden tan, patternless; lateral surface between nares and anterior collar, brown with a white reticulum, the white lines wider posteriorly; pattern of white reticulations on brown base continues ventrally onto peripheral gular region, superficial to mandibles and M. pterygomandibularis; white component of peripheral gular pattern progressively expands between corner of mouth and mandibular symphysis forming a pattern of brown spots on a white background. Central gular region dark blue-gray, with median black patch where underlying second ceratobranchials of hyoid apparatus depress gular pouch. Anterior and posterior nuchal collars black, interrupted middorsally; anterior collar interrupted by nine scales, posterior collar by seven; a wide, middorsally interrupted, pale gray bar separates anterior and posterior collars; both collars with narrow white anterior and posterior borders; posterior collar terminates ventrally above the suprahumeral dermal mite pocket; anterior collar complete ventrally along transverse gular fold. Black pigment extends anteriorly beyond transverse gular fold, continuous with black pigments of black median gular patch;
patchy black pigment extends posteriorly beyond transverse gular fold onto pectoral region. Dorsal body surface brown, boldly spotted with numerous subequal, white spots and only occasional white dashes; pattern of proximal tail and proximal thigh appears as a continuation of dorsal pattern. Ventrolateral coloration brown with grayish mottling. A narrow, discontinuous mid-dorsal zone of lighter ground color, pale gray middorsal stripe fragments in front of anterior collar and within the interrupted region of posterior collar. Dorsal surface of laterally compressed tail with bold, broad white vertebral stripe; lateral surface of anterior one-half of tail brown with numerous small white spots, white gradually expands posteriorly, posterior one-half of tail uniform pale gray. Forelimbs without distinct pattern, tan, with yellow blotching above. Proximal thighs brown with white spots and dashes above, dorsal surface of distal thigh grades abruptly into yellow–tan with small, light brown spots, spots do not continue onto pes. Ventral color of body and limbs off-white, a pair of large, dark brown patches with irregular margins cover proximal 25% of thigh and extend from groin, one-half way to forelimb insertion, patches separated medially by as few as one scale in places. Ventral surface of tail immaculate white, shading to gray over posterior one-half of tail. Paired melanic mucron present on distal 13 subcaudal scales. Ventrum has scattered reddish-brown stains.

Color pattern in life.—The following are direct observations of a living adult male on 12 September 1992 at the type locality, as viewed from a distance of about 2 m, perched on a granitic rock in full sun. Dorsal ground color of head, body, anterior tail, and proximal portion of the thigh, dark brown. Dorsal body pattern consisting of large white spots with a few interspersed dashes, no transverse bars. Fragmented, white vertebral stripe present, appears continuous with bold white dorsal caudal stripe. Tail spotted anterolaterally, grading into solid white by distal one-third. Temporal pattern of white reticulations on brown ground color. Two black collars present; anterior and posterior collars nearly continuous dorsally, separated by white bar tinged with green. Forelimbs golden–yellow, nearly patternless with a few scattered brown spots. Hind limbs brown over proximal thigh, with scattered white dorsal spots; yellow distally with scattered minute brown spots.

Variation.—The pattern of squamation and neck folding is fairly constant within Crotaphytus grismeri, and in fact within the entire genus. Variation in meristic characters of C. grismeri and C. bicinctores, C. insularis, and C. vestigium, the three taxa with which it is most similar, is given in Table 2.

As in all Crotaphytus, there is strong sexual dimorphism in C. grismeri, with males reaching a longer SVL (99 mm) than females (83 mm) and having hypertrophied jaw adductor musculature. Adult males of C. grismeri have strong lateral tail compression, a condition not present in juveniles or adult females.

The color pattern of Crotaphytus grismeri varies ontogenetically and sexually in adults (Fig. 1A–C). The dorsal body and anterolateral caudal pattern of neonates has white reticulations on a tan ground color, with black pigmentation filling some of the anterior white subquadrate rings. The black spots are arranged in transverse rows. The posterior collar may be composed of what appear to be juxtaposed black-filled reticulations, with dorsal and ventral portions of the white reticulations absent. Six or seven pale transverse bars are present, including the bar that separates the anterior and posterior collars. Observations of living lizards indicate that these bars vary in color between peach and bright orange. These transverse bars are lost at some point prior to adulthood. The reticulated dorsal pattern begins to fragment into spots early in ontogeny, and the black pigment fades first to dark brown, then disappear. An obvious, pale tan dorsal caudal stripe is present in juveniles of both sexes. This stripe appears to be lost in adult females, although a poorly defined stripe is present in one adult female (UABC 115). Hind limb color pattern is variable in juveniles with some individuals having nearly patternless hind limbs save for the mi-
nute tan or brown spotting on the proximal thigh. Others have a pattern of reticulations on the thigh with small brown spots below the knee. The forelimbs resemble the adult condition in that they are patternless. As juvenile males approach adulthood, they acquire sexually dichromatic color pattern features, including a ventrally complete anterior collar, black or dark brown inguinal patches, a blue-gray central gular pattern with a black median patch (Fig. 2), and a bold white or pale gray caudal stripe lining the dorsal surface of the strongly laterally compressed tail. Females lack such features but differ from juveniles in the presence of a spotted dorsal pattern and a lateral row of three (only two in CES 067-627) large black spots outlined with white (Fig. 1B). Gravid females develop a vivid orange or red-orange pattern of transversely arranged bars and spots (Fig. 1C).

**Distribution.**—*Crotaphytus grismeri* is known only from the type locality and a sight record in Cañada La Palma, approximately 6 km W of El Faro (Fig. 3). It is presumed to be restricted to the Sierra de Los Cucapás and the contiguous Sierra El Mayor, an isolated granitic mountain range in extreme northeastern Baja California, México. This 80 km long, 10 km wide mountain range is isolated from the Sierra Juárez of the Peninsular Ranges to the west by Laguna Salada, a 15 km wide flood plain that occasionally is inundated by waters from the Gulf of California. The substrate within Laguna Salada is hardpan with scattered aeolian sand. The rocky substratum required by the saxicolous *C. grismeri* is entirely absent, thus isolating this species to this mountain range.

The locality given for the specimen collected by Goldman (USNM 37625) is Volcano Lake, Lower California. This locality is ambiguous because it may refer to Cerro Prieto, an isolated volcanic peak on the northwestern border of Volcano Lake or to the Sierra de Los Cucapás, which lie a few kilometers to the west of the lake. Based on the accounts of Goldman (1951) and Nelson (1922), it would appear that Cerro Prieto is the more likely locality from which the specimen was taken. However, no in-
Fig. 2.—Ventral view of a pair of adult male Crotaphytus grismeri. Note the enlarged melanic inguinal patches and ventrally complete collars.

dividuals were observed in two visits to Cerro Prieto during what normally would be considered optimal conditions. Furthermore, USNM 37625 cannot be differentiated from C. grismeri from the Sierra de Los Cuacapás. Therefore, the presence of C. grismeri on Cerro Prieto is considered unlikely.

Comparisons with other species.—Crotaphytus grismeri appears to be the smallest member of the genus, reaching a maximum SVL of 99 mm. Other species of Crotaphytus reach at least the following adult sizes: C. reticulatus, 137 mm (Montanucci, 1976); C. collaris, 131 mm; C. dickersonae, 116 mm; C. bicinctores, 111 mm; C. insularis, 121 mm; C. vestigium, 125 mm. It is likely that C. grismeri reaches slightly larger adult sizes than 99 mm. However, specimens as small as 87 mm SVL (UABC 116) may have well developed adult male characteristics (strongly laterally compressed tail, bold white dorsal caudal stripe, well developed melanic inguinal patches, ventrally complete collar), and based on the specimens at hand it is not possible to say at what SVL males acquire the adult morphology. The small size of this species is only approached by C. bicinctores, which may acquire an adult color pattern and morphology at a SVL of 90 mm. Because C. vestigium is the only other species of Crotaphytus found in the general vicinity of the Sierra de Los Cuacapás, it is particularly appropriate to compare the size ranges of these two species. The size of C. vestigium varies clinally, with the most southerly populations in Baja California Sur, México rarely reaching a SVL of 108 mm, while individuals from northern populations often surpass 120 mm SVL. A specimen from Mountain Springs, Imperial County, California, a locality only approximately 37 km from the northern portion of the Sierra de Los Cuacapás, was 125 mm SVL (REE 2935). Thus, adjacent populations of C. grismeri and C. vestigium differ greatly in maximum adult size.

Juveniles of both sexes of Crotaphytus grismeri have a well demarcated, pale tan dorsal caudal stripe. In C. reticulatus, the tail may have a blotched or reticulated pattern; a vertebral stripe was never observed. In juvenile C. collaris, the tail pattern is one of transverse, paravertebral white bars rather than a vertebral stripe. In C. dickersonae, large adult males have a pale dorsal caudal stripe; however, a stripe was not present in the only two juveniles (AMNH 248178, 248180, both males) available for study. All females and all but the largest males also lacked the caudal stripe. In C. bicinctores, C. insularis, and C. vestigium, adults of both sexes may have a dorsal caudal stripe. In these species, the dorsal caudal region of juveniles may be pale in color but lacks a well demarcated vertebral stripe. Juveniles of C. grismeri can be distinguished from all other Crotaphytus on the basis of this dorsal caudal stripe.

Crotaphytus grismeri differs from C. reticulatus and C. collaris in that adult males have a tail that is strongly compressed laterally with a bold white or pale gray dorsal stripe, rather than a round or only slightly compressed tail without an obvious dorsal stripe. A laterally compressed tail with a dorsal caudal stripe is
FIG. 3.—Dot distribution map for *Crotaphytus grismerti*. The southernmost dot represents the type locality in Cañón David, a low elevation pass between the contiguous Sierra de Los Cucaños and Sierra El Mayor. The northernmost dot represents a sight record for *C. grismerti* in Cañada La Palma approximately 6 km W of El Faro. Laguna Salada, a flood plain that is occasionally inundated by water from the Gulf of California and presumably acts as a dispersal barrier, is represented by the wavy line pattern. The Sierra Las Pintas, Sierra Las Tinajas, Sierra Juárez, and Sierra San Pedro Mártir are inhabited by *C. vestigium*. 
also present in adult males of *C. dickersonae*, *C. bicinctores*, *C. insularis*, and *C. vestigium*. *Crotaphytus grismeri* also differs from *C. reticulatus* and *C. collaris* in the presence in adult males of paired, large, black or dark brown inguinal patches (Fig. 2). These ventral melanic patches extend from the hind limb insertion anteriorly to a point approximately midway between the hind limb and forelimb insertions and cover the proximal 25% of the thigh. Inguinal patches are entirely absent in *C. reticulatus*. Much smaller patches are occasionally present in *C. baileyi* and are always present in adult male *C. nebrinus*. The much smaller patches of certain *C. collaris* are roughly one-third the size of the large patches of *C. grismeri* and are thus easily distinguishable. The presence of large patches in *C. grismeri* is also characteristic of *C. dickersonae*, *C. bicinctores*, *C. insularis*, and *C. vestigium*.

*Crotaphytus grismeri* differs from *C. reticulatus*, *C. collaris*, and *C. dickersonae* in its lack of black oral melanin. Black oral melanin is also absent in *C. bicinctores*, *C. insularis*, and *C. vestigium*.

*Crotaphytus grismeri* differs from *C. bicinctores*, *C. insularis*, and *C. vestigium* in the color pattern of the forelimbs. *Crotaphytus grismeri* is characterized by nearly patternless forelimbs, with scattered minute brown spots (when present) confined to the proximal dorsal surface near the forelimb insertion. The pattern in *C. bicinctores* and *C. insularis* is characterized by brown or yellow forelimbs with a bold pattern of white reticulations extending to the manus. *Crotaphytus vestigium* usually has this pattern, although approximately 30% of the specimens examined had a relatively patternless forelimb (although rarely to the degree observed in *C. grismeri*). The hind limb of *C. grismeri* is brown proximally, with scattered white spots, abruptly shifting to nearly patternless yellow with minute brown spots at the distal thigh and continuing onto the pes. *Crotaphytus insularis*, *C. vestigium*, and *C. bicinctores* differ in that the hind limbs are brown with a pattern of white spotting or reticulations on the dorsal thigh with white or yellowish reticulations continuing distally beyond the knee onto the pes.

*Crotaphytus grismeri* further differs from *C. vestigium* and *C. insularis* in its dorsal pattern and collar. In *C. grismeri*, the dorsal pattern is one of subequal white spots without white transverse dorsal bars. In *C. vestigium*, the dorsal pattern is one of white dots and dashes with several narrow white transverse dorsal bars. In *C. insularis*, transverse dorsal bars are also present, though fragmentary and not as straight as in *C. vestigium*. The posterior collar of *C. grismeri* is narrowly incomplete dorsally while in *C. vestigium* and *C. insularis*, the posterior collar is broadly incomplete posteriorly, if present at all.

In addition to the features that distinguish *C. grismeri* from all other *Crotaphytus*, this species differs from *C. bicinctores* in that it lacks the alternating light and dark banding of the dorsal ground color.

**Natural history.** — *Crotaphytus grismeri* is saxicolous and all lizards observed at the type locality were basking on small to medium sized granitic rocks on rock-strewn hillsides. Lizards were observed at all levels on the hillsides, from the rocky rubble at the bases of the hills to the tops of the hillsides 100–200 m above.

The activity season for the species extends at least from early March to early November. An adult male (98 mm SVL) was observed on 6 March 1993 and a juvenile male was observed on 7 November 1992. The latest date on which an adult has been observed was 12 September 1992. However, this was a gravid female and it is certain that the activity period extends at least for a few more weeks. Several gravid females were observed on 2 May and 16 May 1992 and this, together with the presence of a gravid female in early September, suggests that second clutches may be produced. Several neonates ranging in SVL between 50 and 63 mm were observed on 12 September along with the gravid female, which further supports the contention that second clutches may occur.

**Discussion**

The majority of the characters that diagnose *Crotaphytus grismeri* are color pattern features (as opposed to differences in squamation). A brief digression on the
value of color pattern characters in the phylogeny of *Crotaphytus* seems appropriate. McGuire (unpublished data) found color pattern features to be the most important set of characters in a phylogenetic analysis of *Crotaphytus*, not only because sets of taxa are characterized by different character states, but also because there is very little variation in these character states within species. Second, the particular color pattern features used in the diagnosis of *C. grismeri* include not only autapomorphies for the species but plesiomorphic retentions as well. Therefore, character states such as the absence of white transverse dorsal bars and the presence of posterior collar markings that contact or nearly contact dorsally are states that evolved early in the history of *Crotaphytus* and were later modified in the common ancestor of *C. vestigium* + *C. insularis*. That these characters were modified in this common ancestor but not in *C. grismeri* has two important ramifications. First, it is evident that *C. grismeri* has been isolated in the Sierra de Los Cucañás for a long time. Second, because *C. vestigium* (the only nearby population of *Crotaphytus*) is more closely related to *C. insularis* than it is to *C. grismeri*, it is clear that *C. grismeri* represents a lineage distinct from *C. vestigium*. Finally, it should be noted that the absence of discrete differences in squamation is not surprising given that crotaphytids are characterized by granular dorsal body scales and relatively undifferentiated head squamation. Indeed, only three discrete intra-generic scale differences, none of which vary among the four species considered here, were discovered in an intensive survey by the author.

It is not surprising that such a distinctive species of *Crotaphytus* occurs in the Sierra de Los Cucañás and Sierra El Mayor. This mountain range is isolated from the Peninsular Ranges by a broad flood plain that lacks rocky habitat. This isolation has resulted in a very depauperate saxicolous herpetofauna in the Sierra de Los Cucañás and Sierra El Mayor, despite the abundance of rocky habitat. The only other saxicolous species known from the range is *Sauromalus obesus* (*Crotalus mitchelli*), which is not entirely saxicolous, is known from the range, as well), while saxicolous reptiles known from the adjacent Peninsular Ranges, such as *Phyllodactylus xanti*, *Coleonx switaki*, *Sceloporus orcuttii*, *Urosaurus microscutatus*, *Petrosaurus mearnsi*, *Lichanura trivirgata*, and *Tri-morphodon biscutatus*, appear to be absent (Grismer, 1992; personal observation).

The Sierra de Los Cucañás and Sierra El Mayor appear to have been isolated from the Peninsular Ranges to the south and west for their entire history (Barnard, 1970). Furthermore, they probably existed as a Pliocene island following the northward extension of the Gulf of California (Gastil et al., 1983). Thus, *Crotaphytus grismeri* and *S. obesus*, the two saxicolous reptile species known to inhabit this range, probably dispersed either overland or overwater in order to reach the range. Given the current nature of Laguna Salada, overwater dispersal would appear to have been a more likely avenue for the colonization of this range by these species. This may explain the paucity of saxicolous species in a large mountain range with abundant rocky habitat.

**Resumen**

Se describe una nueva especie de lagartija de collar, *Crotaphytus grismeri*, cuya distribución está restringida a las Sierras de Los Cucañás y El Mayor, Baja California, México. Esta especie se diferencia de otras especies de *Crotaphytus* por su menor tamaño; pigmentación verdosa sobre un fondo blanco en la banda que separa los collares anterior y posterior; coloración naranja opaco sobre las extremidades posteriores y cola en hembras subadultas; y una línea dorsal bien marcada de color gris claro en jóvenes de ambos sexos.

**Acknowledgments.** — First and foremost I thank E. Mellink of Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California for facilitating the acquisition of scientific collecting permit No. 01303, which was obtained from the Instituto Nacional de Ecología, Dirección General de Aprovechamiento, Ecológico de los Recursos Naturales, Dirección de Flora y Fauna Silvestres. For assistance in the field, I thank E. Gergus, J. Grismer, L. Grismer, and B. Hollingsworth. Particular thanks go to B. Hollingsworth for rediscovering this population and bringing it to my attention. L. Grismer, R. Montanucci, and R. Etheridge commented on various drafts of the manuscript. In particular, I thank R. Etheridge,
who reviewed several drafts of the manuscript and provided much editorial assistance. For the loan of specimens, I thank L. Grismer, E. Liner, and the following curators and their institutions: P. Damiani, D. Frost, and C. Myers (AMNH), J. Sites (BYU), J. Gauthier, A. Leviton, and J. Vindum (CAS), C. McCoy and E. Censky (CM), W. Duellman (KU), R. Etheridge (REE, SDSU), G. Pregill and R. Sullivan (SDSNH), D. Cannatella and T. Reeder (TNC), C. Lowe (UAZ), D. Bakken (UMINH), A. Kluge and G. Schneider (UMMZ), R. Crombie, A. Wynn, and G. Zug (USNM), and C. Lieb and R. Webb (UTEP). Standard museum acronyms follow Leviton et al. (1985). Portions of this work were supported by grants from the Theodore Roosevelt Memorial Fund of the American Museum of Natural History, Sigma Xi, the Scientific Research Society, and the Department of Biology of San Diego State University.

LITERATURE CITED


Accepted: 5 November 1993

Associate Editor: Stephen Tilley

APPENDIX I

Specimens Examined

Institutional abbreviations follow Leviton et al. (1985). Additional abbreviations include CES (Centro Ecológico de Sonora, Hermosillo, México), EL (Ernest Liner preserved collection), JAM (Jimmy A. McGuire preserved collection), LLG (L. Lee Grismer preserved collection), REE (Richard E. Etheridge osteological collection), and UABC (Universidad Autónoma de Baja California, Ensenada, México).


Crotaphytus insularis.—CAS 21948–49, 22712, 148650–52; SDSNH 19971, 19973–75, 50664, 53064; SDSU 1782–33.

Crotaphytus vestigium.—BYU 2422, 2432, 2435, 2438, 19788, 19792; CAS 14000–01, 18922, 146684, 154267–71; LLG 1062, 1935; REE 2935; SDSNH 17052, 19789, 19791, 24392, 26754, 37815, 45978, 52951; SDSU 1727, 1729.

Crotaphytus reticulatus.—CM 52334–35, 64677, EL 3250–1, 3250–2, 4130, 4138, 4748, 4816; SDSNH 41333, 46684–86, 56755–55; TNCNH 5874–75, 8995, 13389–90, 28364, 29059–60; USNM 3984.

NOTE ADDED IN PROOF.—Eleven additional specimens (six preserved, five osteological) have been deposited in the Museo de Zoología collection at the Universidad Nacional Autónoma de México (UNAM). Two of the five osteological specimens have a frontonasal bone, which is unique among crotaphytids. The presence of this bone is considered an additional autapomorphy for the species.