A NEW SPECIES OF *BARISIA* (SAURIA, ANGUIDAE) FROM OAXACA, MEXICO

John P. Karges and John W. Wright[1]

ABSTRACT. A new species of *Barisia* from the cloud forest of the Sierra Juarez, Oaxaca, Mexico, has both paired postmental scales and complete series of superciliary scales and therefore is assigned to the *gadovi* species group. It differs from the other species of this group (*gadovi* and *antauges*) by having distinctly barred labial regions. It also has two or more subocular scales and smooth dorsal scales (only one subocular and distinct keeling in *B. gadovi*) and a dorsal color pattern with at least traces of dark, posteriorly directed chevrons (absent in *B. antauges*). With a maximum snout-vent length of 77 mm (N = 95), this is the smallest member of the *gadovi* species group and previously has been confused in collections with the sympatric, similar-sized *B. viridiflava* of the *moreletii* group. All members of the *moreletii* group have single postmental scales and *B. viridiflava* has acutely keeled dorsal scales. Like congeners, *B. juarezi* new species is viviparous.

RESUMEN. Una nueva especie de *Barisia* del bosque nebuloso de la Sierra Juárez, Oaxaca, México, tiene escamas postmentales pareadas y una serie completa de escamas superciliares; y por lo tanto, es asignada al grupo *gadovi*. Esta difiere de las otras especies de este grupo (*gadovi* y *antauges*) por tener las regiones labiales distintivamente barreadas. Esta también tiene dos o más escamas suboculares y escamas dorsales sin quillas (solamente una escama subocular y quillas distintivas en *B. gadovi*) y el patrón del color dorsal con por lo menos trazas oscuras en forma de cheurones (galones) oscuros, dirigidas posteriormente (ausentes en *B. antauges*). Con una longitud hocico-cloaca máxima de 77 mm (N = 95), este es el miembro más pequeño del grupo *gadovi* y en colecciones anteriores, ha sido confundido con *B. viridiflava,* una especie del grupo *morletti,* que es simpátrica y de tamaño similar. Todos los miembros del grupo *morletti* tienen solamente una escama postmental y *B. viridiflava* tiene escamas dorsales agudamente aquilladas. Como sus congéneros, *B. juarezi* nueva especie, es vivípara.

INTRODUCTION

As generally understood, the anguid lizard genus *Barisia* consists of seven species arrayed in three species groups (Tihen, 1949). These species occur from northern Mexico southward to western Panama. Some species have comparatively wide distributions, such as *Barisia imbricata,* which occurs over a broad area including the Sierra Madre Oriental, Sierra Madre Occidental, Mesa Central, and Sierra Madre del Sur; others are restricted to single mountains or isolated ranges (*B. viridiflava, B. levicollis,* and *B. antauges*). The habitats occupied by *Barisia* are primarily seasonally wet montane llanos, and forest-edge grassland in pine and/or oak woodlands or cloud forest. These habitats have been relatively poorly explored by biologists, in large part due to inaccessibility, and may remain poorly known owing to the rapid deforestation and habitat alterations by man. The extensive highlands of southern Mexico are not contiguous and consist of isolated mountain ranges and intervening valleys that constitute effective ecological barriers for montane organisms. These areas have a high level of species endemism. We describe here a new species of *Barisia* endemic to the Sierra Juarez in northern Oaxaca that was independently discovered by each of us. We name it in honor of one of Mexico's greatest heroes, Benito Juarez, a man who was also indigenous to the region.

Barisia juarezi new species

Figures 1–5

HOLOTYPE. University of Texas at Arlington (UTA) R-8485, an adult male, from the northern slope of the Sierra Juarez between 6.1 and 11.6 km (3.8 and 7.2 mi.) N crest of Cerro Pelon, Ixtlan District, Oaxaca, Mexico, 7 April 1979, by J.A. Campbell, L.S. Ford, J.E. Joy, Jr., and J.P. Karges at approximately 2500–2700 m elev. (original number, JAC-3708).

PARATYPES. Ninety-four, see Specimens Examined, below.

DIAGNOSIS AND DEFINITION. *Barisia juarezi* is a member of the *gadovi* species group as defined by Tihen

1. Section of Herpetology, Natural History Museum of Los Angeles County, Los Angeles, California 90007, USA. Present address of Karges: Fort Worth Nature Center, Route 10, Box 53, Fort Worth, Texas 76135, USA.

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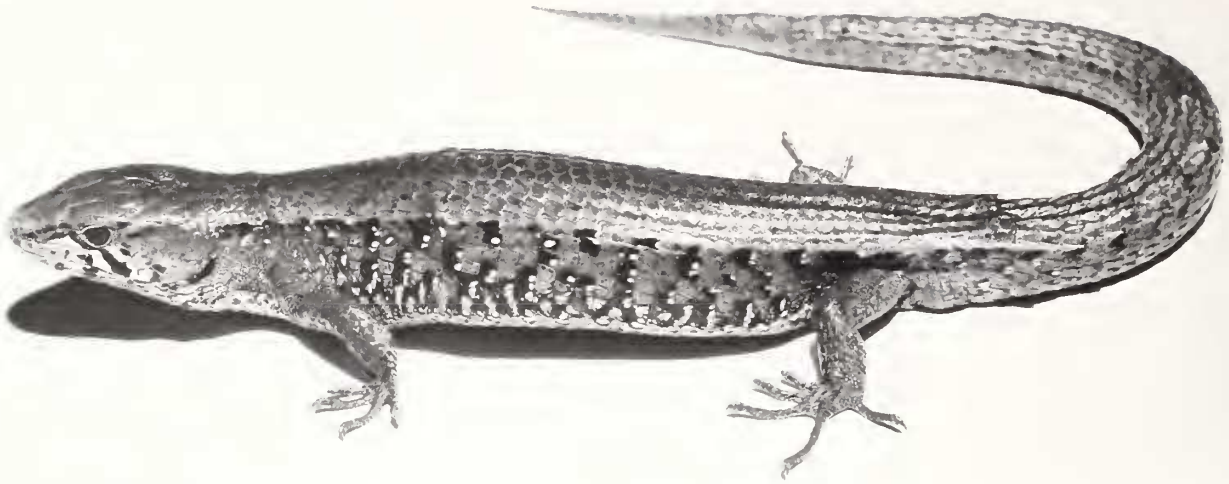

Figure 1. Dorsolateral view of an adult male (LACM 130277, 77 mm SVL), paratype of *Barisia juarezi* new species photographed in life.

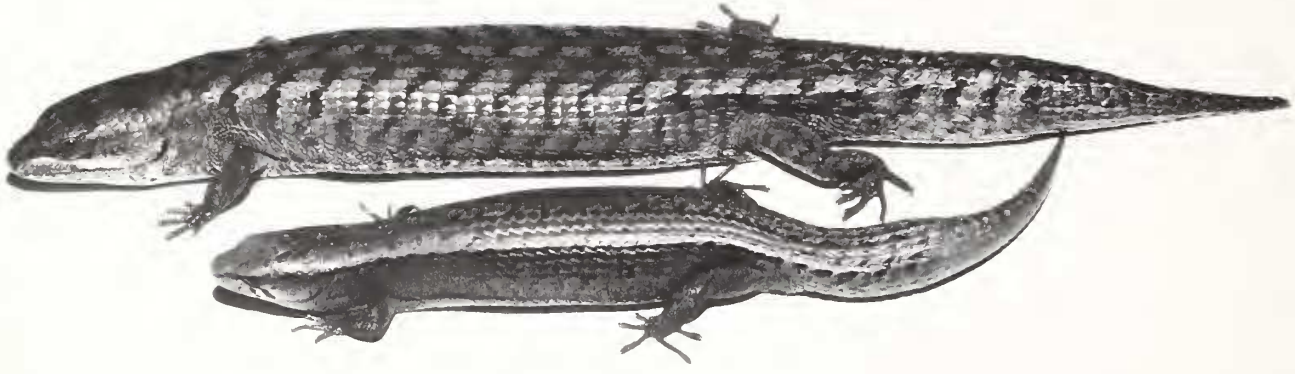

Figure 2. Dorsolateral views of adult female *Barisia gadovi* (upper, LACM 129612) and paratype of *B. juarezi* new species (lower, LACM 129615) photographed in life. The differences in facial markings, dorsal color pattern, and size are conspicuously illustrated.

(1949), with both paired postmental scales and complete series of superciliary scales. It is the smallest member of the group (maximum observed snout-vent length, 77 mm) and differs from the other species of the group, *B. gadovi* and *B. antauges* (here including *B. modesta*), by having two distinct dark diagonal labial bars with an intervening white bar, extending from the posterior supralabials to the orbit and along the lower border of the subocular (Figs. 1 and 2). The much larger (to 102 mm SVL, Tihen, 1949) *B. gadovi* has a single, horizontal light supralabial stripe, and *B. antauges* has dark and light mottled supralabials but no stripes or bars. In addition, *B. juarezi* differs from *B. antauges* by the presence of at least traces of dark, posteriorly directed chevrons (Fig. 3), a characteristic shared with *B. gadovi* where the chevrons are generally more distinct (Fig. 4). *Barisia juarezi* and *B. antauges* both differ from *B. gadovi* in the presence of two or

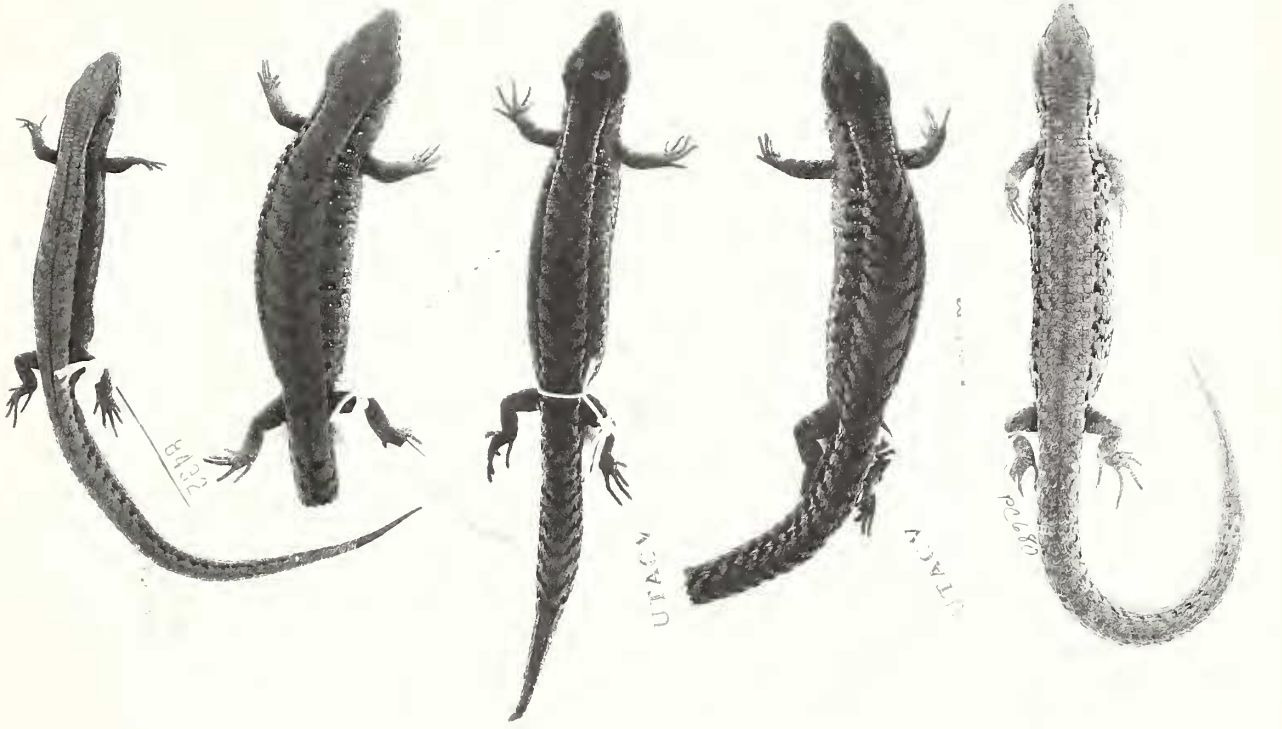

Figure 3. Variation in dorsal color pattern of male *Barisia juarezi* new species. Specimens (all paratypes) range in snout-vent length from 53 mm to 71 mm and are UTA R-8432, 8425, 5806, 8489, and LACM 130277 from left to right.

more suboculars (only one in *B. gadovi*) and smooth dorsal scales (distinctly keeled in *B. gadovi*).

DESCRIPTION OF HOLOTYPE. An adult male, 65 mm snout-vent length, with complete tail (89 mm) and total length (154 mm) to tail ratio of 0.58; head width, 9.75 mm; head length to anterior auricular margin, 13.0 mm; greatest head depth, 7.35 mm; horizontal length of right orbit, 2.45 mm; axilla-to-groin length, 39.5 mm; longest toe (fourth) on right hind foot, 5.92 mm, on right front foot, 4.57 mm.

Three anterior internasal scales, right side with large median and smaller lateral scale, occupying same amount of space as single left internasal (Fig. 5); two anterior internasals in medial contact posterior to rostral; rostral, first supralabial (by small lateral internasal on right side), nasals, posterior internasals, and supranasals in contact with anterior internasals; no postrostral; supranasals longer than wide, not in medial contact; right posterior internasal longer than wide and in medial contact with anterior element of divided left posterior internasal; anterior element of left posterior internasal generally rhomboidal and slightly larger than posterior element, effectively forming an anterior canthal; two left internasals equal in size to right; two postnasals on each side, lower nearly twice size of upper and more than half as large as nasal; single large loreal on each side, contacting third and fourth supralabials, both postnasals, posterior internasals (posterior element on left), single preocular, first superciliary, and narrowly contacting first medial supraocular on right side; frontonasal rhomboidal, about as long as wide, contacting both posterior internasals and both prefrontals; paired prefrontals in medial contact posteriorly, about as large as

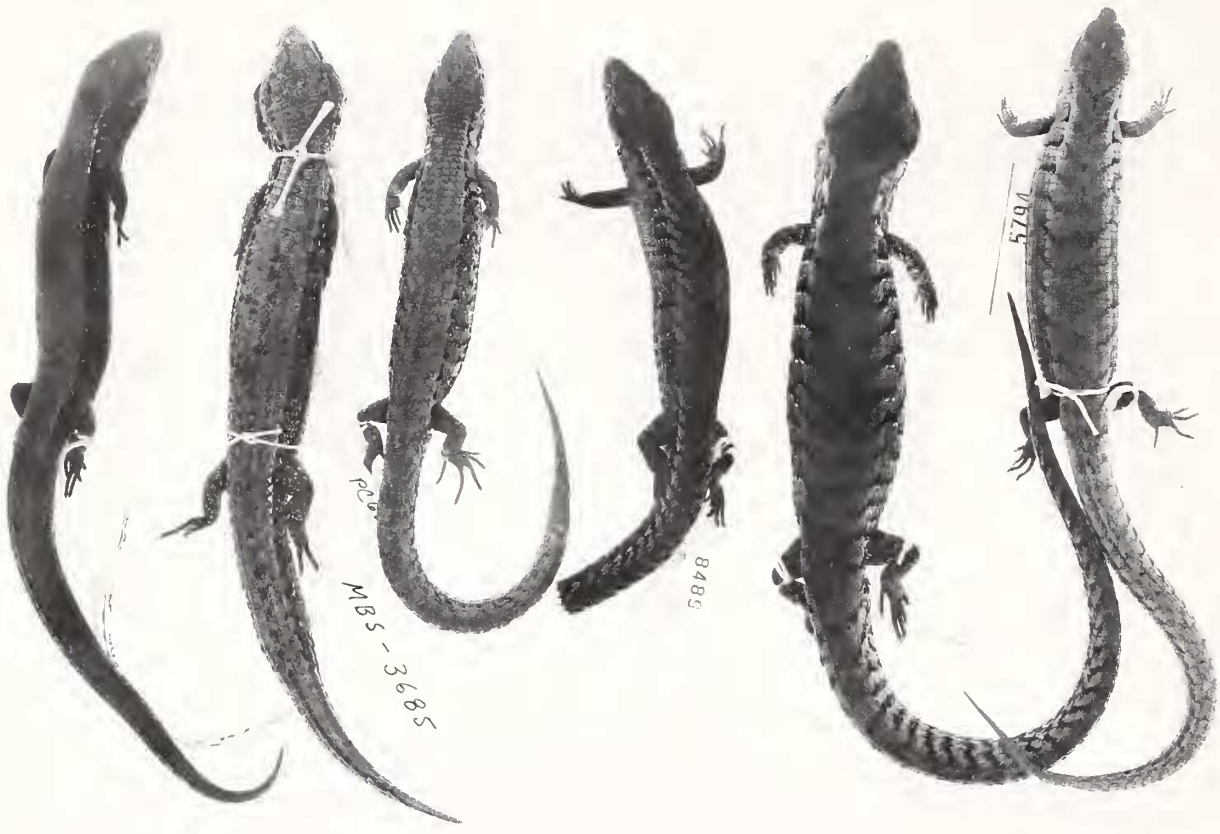

Figure 4. Dorsal views of representative pairs of adult specimens of members of the *Barisia gadovi* species group. From left to right the specimens are *B. antauges*—BMNH 1903.9.30.122, 72 mm SVL and MBS 3685, 82 mm; *B. juarezi* new species—LACM 130277, 71 mm and UTA R-8489, both paratypes, 67 mm; and *B. gadovi*—LACM 121921, 93.5 mm and UTA R-5794, 74 mm.

frontonasal, abutting frontal; frontal large, twice as long as wide; five medial supraoculars and two small lateral supraoculars on each side; six superciliaries over each eye, first largest; frontoparietals rhomboidal, much smaller than adjacent frontal and parietals; supralabials 9/9, antepenultimate largest and last to reach orbit at posterior margin of second subocular; two elongate suboculars and three discrete postoculars on each side; primary temporals 4/4, lowest narrowly contacting posterior subocular on each side; secondary temporals 5/5; tertiary temporals 4/4, with small azygous scale on right between uppermost tertiary temporal and right paraoccipital; rosette of scales around interoccipital, including two parietals, interparietal (containing parietal eye in posterior half), two paraoccipitals and medially paired postoccipitals; infralabials 8/7; sublabials 5/5, extending in series anteriorly to second infralabial and second pair of chinshields; five pairs of chinshields posterior to mental, first being medially paired postmentals; second pair of chinshields only other pair in medial contact; single medial gular scale between second and third pairs of chinshields.

Eight smooth nuchal scales across narrowest part of nape; granular scales extending from auricular opening posteriorly along lateral surfaces of neck and along lateral fold; dorsal and ventral body scales in parallel, regular (not oblique) rows both transversely and longitudinally; transverse dorsal scale rows from postoccipitals (inclusive) to level of posterior margin of thigh, 48; all dorsal scales smooth, in 14 longitudinal rows and of uniform size across midbody; an additional row

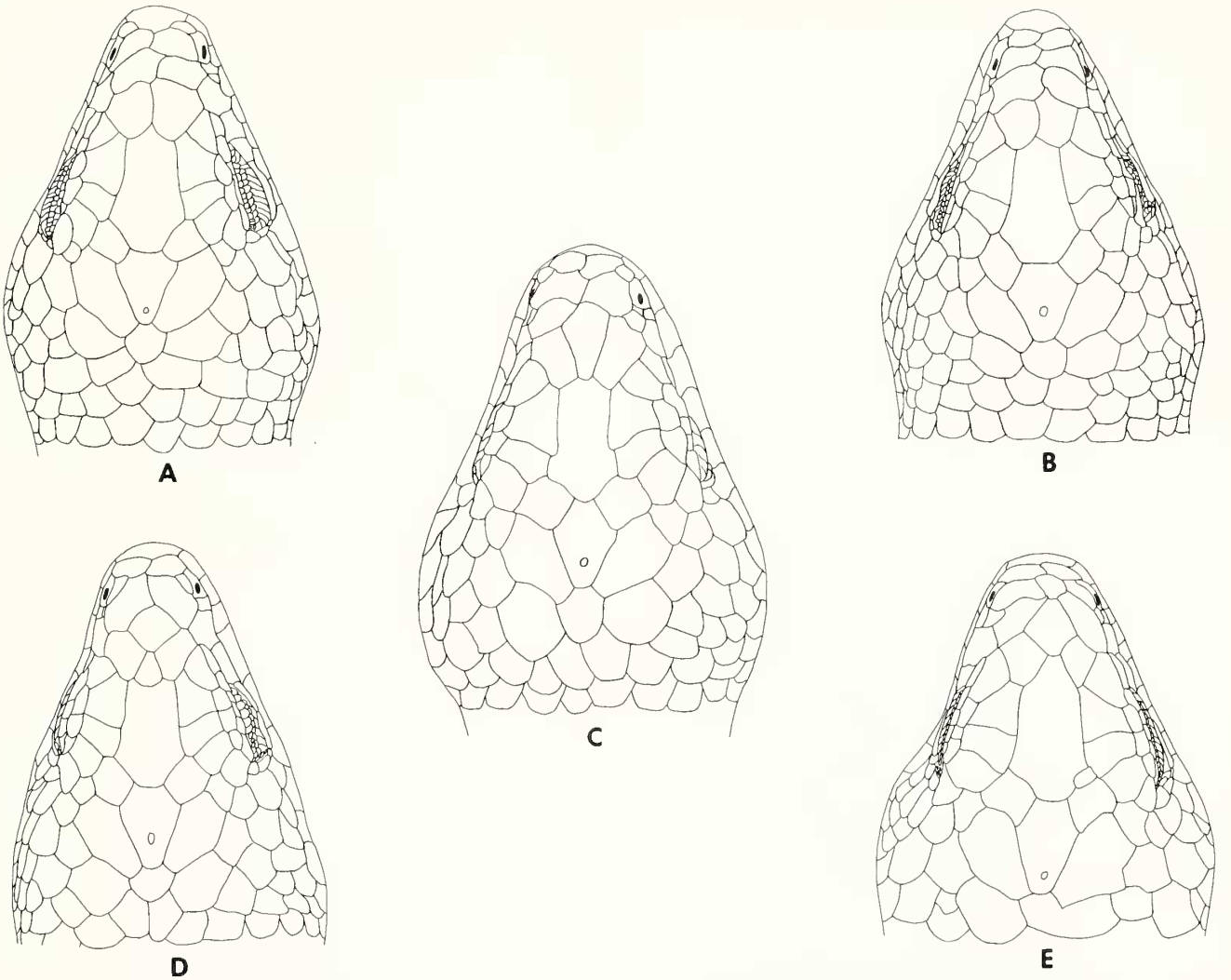

Figure 5. Variation in head scutellation of representative *Barisia juarezi* new species. Specimens (all paratypes) from A to E are: UTA R-4317, 8456, 8488, 4315, and 5806. See text for descriptions and terminology.

of slightly smaller scales along dorsolateral border of lateral fold on each side; ventral scales across midbody in 12 longitudinal rows; ventrals smooth, in 55 transverse rows from first gular to anterior edge of vent; tail complete with 70 caudal whorls and 23 scales around base; caudal scales arched transversely near base of tail, giving tail a longitudinally keeled texture.

Adpressed limbs separated by 11 transverse dorsal scale rows; enlarged, smooth, imbricate scales on anterior and dorsal surfaces of forelimbs and anterior and ventral surfaces of hind limbs, posterior surfaces with granular scales; toes clawed except for clawless second toe (injured) and freshly severed third toe on hind foot; 16 subdigital lamellae under fourth toe of right hind foot.

Dorsum above third and fourth longitudinal dorsal scale rows with uniform longitudinal pale brown stripe with darker brown spots on several middorsal scales; sides, between lateral fold and third longitudinal scale row, darker brown than dorsum, with irregular, non-continuous dark brown bars (Figs. 1–3), consisting of dark brown individual scales, some white spots on lower posterior margins; individual dark brown scales scattered along dorsolateral portion of body, from nape onto tail, forming spotted line along body; dark brown spots scattered along middorsum and onto tail; ground color of dorsal surfaces of limbs and tail similar to dorsum; venter dark and mottled, individual scales usually containing much more dark pigment than pale; ventral surfaces of tail and limbs similar to venter; lighter areas of ventral scales metallic silver-blue in life and preservative; top of head and posterior part of jaws with pale reddish-brown ground color; preorbital region of face dark brown, including first superciliary scales, upper part of loreal and preocular scales above white suborbital stripe; suborbital stripe an anterior extension of diagnostic white labial bar, covering posterior half of sixth and anterior

third of seventh supralabial; dark brown diagonal bar, posterior to white bar (also diagnostic) on posterior half of seventh and anterior half of eighth supralabial; anterior five and posteriormost supralabials pale brown; anterior half of sixth supralabial also brown, completing diagnostic pattern of two dark diagonal bars with intervening pale bar on upper jaw; lateral surfaces of neck uniform brown.

VARIATION

We attempted to select from the type series a holotype specimen that was modal in as many features as possible. The following analysis of variation is thus focused on departures from these modal conditions in the same sequence as contained in the preceding description of the holotype. The analysis is based on all 95 specimens contained in the hypodigm (see Specimens Examined, below).

SIZE AND BODY DIMENSIONS

The largest specimen is a female (77 mm in SVL) but there is no significant difference between the mean sizes (Mann-Whitney $U = 81.82$, $P \ll 0.05$) of the 15 largest females (mean ± SE, 70.1 ± 0.90) and 15 largest males (69.6 ± 0.79). Adult male *B. juarezi* have wider heads and larger jaws than females. In 43 individuals with SVL greater than 60 mm (21 ♂♂ and 22 ♀♀) there is a highly significant difference between the sexes in the snout-vent length/head-width ratio (Mann-Whitney $U = 208.72$, $P \ll\ll 0.01$, ♂♂ 6.48 ± 0.12, 5.77–7.83 and ♀♀ 7.52 ± 0.09, 6.64–8.30). There is also a significant difference in relative tail lengths between the sexes ($|Z|$—transformed Mann-Whitney $U = 4.334$, $P \ll 0.01$) calculated for 30 specimens greater than 50 mm SVL, with complete, unregenerated tails (♂♂ 1.38 ± 0.02, 1.23–1.50, N = 17 and ♀♀ 1.33 ± 0.03, 1.09–1.50, N = 13). The relatively longer tail of males results in a mean difference of one percent between males (57%) and females (58%).

SCUTELLATION

In general, we use the scale terminology of Tihen (1949) with modifications proposed by Waddick and Smith (1974). Occasionally we have found it necessary to redefine some conditions as they pertain to *B. juarezi.* The standard positions of several scales (e.g., frontal, nasals, rostral) of gerrhonotines provided reference points for identifying other scales.

The anterior internasals are most frequently paired (45 of 95 specimens); occasionally single (22 specimens including the holotype) or one or both (21 specimens) are divided to form three or four discrete scales (Fig. 5C). In four specimens, a single medial scale is present between the anterior internasals and constitutes a postrostral scale. In animals with four scales (both anterior internasals divided) in a lateral series behind the rostral, the medial pair of scales is best termed the medial internasals rather than medially paired postrostrals, since the postrostral is defined as a single medial azygous scale (Waddick and Smith, 1974), or if two postrostrals are present, they form a longitudinal series. We have not observed a longitudinal series of anterior and posterior postrostrals in *B. juarezi,* but one specimen (UTA R-6096) does have a postrostral scale posterior to a nearly medial element of a divided anterior internasal. When divided into lateral and medial elements, the medial scale is usually larger than the lateral. The anterior internasals of each side contact medially behind the rostral in most specimens (85 of 94, 90.5%); in four specimens the medial contact of the anterior internasals is precluded by the contact of the rostral and enlarged supranasals (Fig. 5A); and in two others, medial anterior internasal contact is precluded by the rostral-postrostral suture.

The supranasals are separated from medial contact by the anterior internasals, posterior internasals, and postrostrals when present, in 72 specimens (77.4%). Individual supranasal scales are roughly triangular and usually longer than wide, although an individual specimen may have one supranasal wider than long on one side. Both supranasals are longer than wide in 53 (57%) specimens, both wider than long in 22 (23.6%), and one longer than wide and the other wider than long in 18 (19.4%). The number of animals with medial contact of the supranasals (21) approximately equals the number of specimens with both supranasals wider than long (22). On the dorsal surface of the snout, the paired scales posterior to the anterior internasals, postrostral, and supranasals are the posterior internasals, among the most variable head scales. Anterior contacts of the posterior internasals variously include the anterior internasals (rarely, Fig. 5D), postrostral (if present), the supranasals (if expanded, Figs. 5A, B), and anterior medial contact of the two posterior internasals (Fig. 5D). The posterior internasals vary in size relative to adjacent scales, and are often asymmetrical, with the scale on one side larger than its counterpart (Fig. 5C). Occasionally one of the posterior internasals is divided into anterior and posterior elements, the anterior element effectively forming a postrostral and the posterior element forming a canthal.

The frontonasal scale is either present (55 specimens), absent (37), or partially fused with the prefrontals (1). The frontonasal is bordered by the postrostral (if present and posteriorly placed), the posterior internasals, and prefrontals. The frontonasal is usually rhomboidal and about as long as wide (Fig. 5D), but sometimes longer than wide (Fig. 5C). The frontonasal varies from one-half to equal in size to the adjacent prefrontals. When the frontonasal is absent, the prefrontals are large and occupy the area where the frontonasal would be on other individuals (Figs. 5A, B). In six of the 37 specimens lacking a frontonasal scale, the prefrontals are partially fused, usually along the anterior half of the medial contact. The remaining 31 specimens lack frontonasals, and the paired posterior internasals and paired, fully divided prefrontals form a linear pattern of paired scales, medially divided, which in some cases also includes the enlarged supranasals and anterior internasals (Figs. 5A, B). There are usually five, occasionally four, medial supraoculars and usually two or three lateral supraoculars but rarely none, one, or four.

The scales on the side of the head of *B. juarezi* are also variable and their definitions require some clarification. Im-

mediately posterior to the nasals are the postnasals. These are usually divided into upper and lower elements but occasionally are fused to a single scale, or, more rarely, divided into three small elements. Usually, a single loreal is present on each side but occasionally there are two on one or both sides of the head. When divided, the loreal is usually divided horizontally into upper and lower elements. The upper element is usually the smaller scale and owing to its position it forms what others (Waddick and Smith, 1974; Campbell, 1982) have called an anterior canthal or cantholoreal. Rarely, the upper or lower loreal elements may be further divided into anterior and posterior elements; in these cases (four specimens) there are three loreal scales. Between the loreals and the orbit is a single preocular (rarely divided into upper and lower elements).

The complete series of superciliary scales extends from the canthus to the posteriormost medial supraocular. Most specimens (91 of 94, 95.8%) have six superciliaries in both series (68 specimens) or in at least one series (923 specimens). Twenty-one animals have five in one or both series, four have seven in one or both series, and one specimen has only four on one side. The anteriormost superciliary scale extends anterior to the eye and is somewhat expanded. In this respect, it could be called the posterior canthal (see Waddick and Smith, 1974, fig. 3 for *Gerrhonotus liocephalus*), but we prefer to include it in the superciliary series as did Bogert and Porter (1967, fig. 5) for *Abronia mixteca*.

In decreasing frequency, there are two, three, or four suboculars, of which the posteriormost is occasionally in contact with the lowest primary temporal. The small but discrete postocular scales occur in a vertical series of two, three, or rarely four scales bordering the posterior margin of the eye.

There are typically four primary temporals, sometimes three or five, in a linear series extending from the supralabial-subocular margin upward to and abutting the frontoparietals. The four secondary temporals, sometimes five, are posterior to the primary temporals. The two uppermost tertiary temporals are in medial contact across the back of the head, forming the postoccipitals (and the first row of transverse dorsal scale rows, see below).

Most specimens have either nine or 10 supralabials on at least one side, but 38 (40.4%) have 10/10, 20 (21.3%) have 9/9, and 26 (27.7%) have nine on one side and 10 on the other. Ten specimens have 11 supralabials on at least one side, and two specimens have 11 on both sides. The most frequent number of infralabials is eight on at least one side (85.1%), and the modal class (41 specimens) has eight on both sides. Other specimens have nine on at least one side (33 specimens, 35.1%), nine on both sides (seven specimens), seven on one or both sides (13 specimens), and a single specimen (LACM 130277) has five infralabials on one side.

We began the counts of transverse rows with the row immediately behind the occipital scale and ended at the level of the posterior edge of the hind limbs. The count was made along the middorsal row. The range for all 95 specimens was 42–55 ($x = 47.34 \pm 2.20$). The number of longitudinal dorsal seale rows, eounted at midbody, was usually 14 enlarged scales of similar size (84.21%, 80 of 95 specimens). There was frequently an additional row of slightly smaller scales on each lateral border. In fact, 62 specimens (65.3%), including the holotype, have this extra row on both sides, or rarely on only one side. Nineteen specimens have only 14 discrete longitudinal scale rows, 14 specimens have 16 rows, and 59 specimens have 14 discrete rows and two additional lateral rows of smaller scales. Two specimens have 14 rows and an additional row only on one side, and one specimen has 12 rows and a lateral row of reduced scales on each side.

The ventral scales are arranged in parallel rows in both longitudinal and transverse series. The transverse series was counted from the most anterior medial gular scale behind the postmentals (wedged between enlarged chinshields) to and including the scale row lining the anterior margin of the vent (preanals). This count was possible on 93 specimens and the number ranged from 50 to 59 ($x = 54.3 \pm 1.92$). The number of ventral rows, counted at midbody between the lateral folds, was 12 in 91 specimens (95.79%), 13 in one specimen, and 14 in three. The preanal margin consists of four, rarely three, large scales with smaller scales lining the lateral edges of the vent. Fifteen specimens have complete, unregenerated tails, with 69–77 (71.0 ± 0.59) caudal whorls. There are 16 to 19 subdigital lamellae under the fourth toe of the hind foot.

COLOR AND PATTERN VARIATION

In life, the dorsum is uniformly light brown, but varies from reddish-brown to tan, often with a bronze tint. The dark brown posteriorly directed dorsal chevrons form a "herringbone" pattern, which may be bold or faint (Figs. 1–3). This pattern is the predominant dorsal pattern of *B. juarezi* and occurs in both sexes (23 of 35 males; 26 of 39 females). Less frequently, the dorsal pattern is obscured to such an extent that the middorsum is entirely uniform (10 males; 12 females), contrasting with the darker, barred dorsolateral surface. In five specimens, a distinct narrow, dark middorsal stripe is present, extending from the occipital or nuchal region posteriorly onto the tail. Frequently, the middorsal area is dark, forming an indistinct stripe through the centers of the chevrons, particularly distinct posteriorly and onto the tail.

The sides of the body are darker than the dorsum, especially in subadult and juvenile specimens. Dark brown scales mark the dorsolateral border from the nape posteriorly onto the tail. In adults, the sides have dark erratic bars from the dorsum to the lateral fold, consisting of dark brown scales, some with white or cream-colored flecking along the posterior scale margin. The lateral bars are most distinct in adult males and much less distinct or occasionally absent in females. The lateral pattern is obscured in juveniles by the entirely dark lateral surface. The ground color of the lateral fold and granular scales on the sides of the neck is gray-brown, with some scattered white flecks, sometimes covering entire scales.

The ventral color pattern is sexually dichromatie. In males, the venter is darkly mottled, with limited patches of pale pigmentation usually confined to the posterior edges of individual scales. In life, and to a lesser extent in preservative,

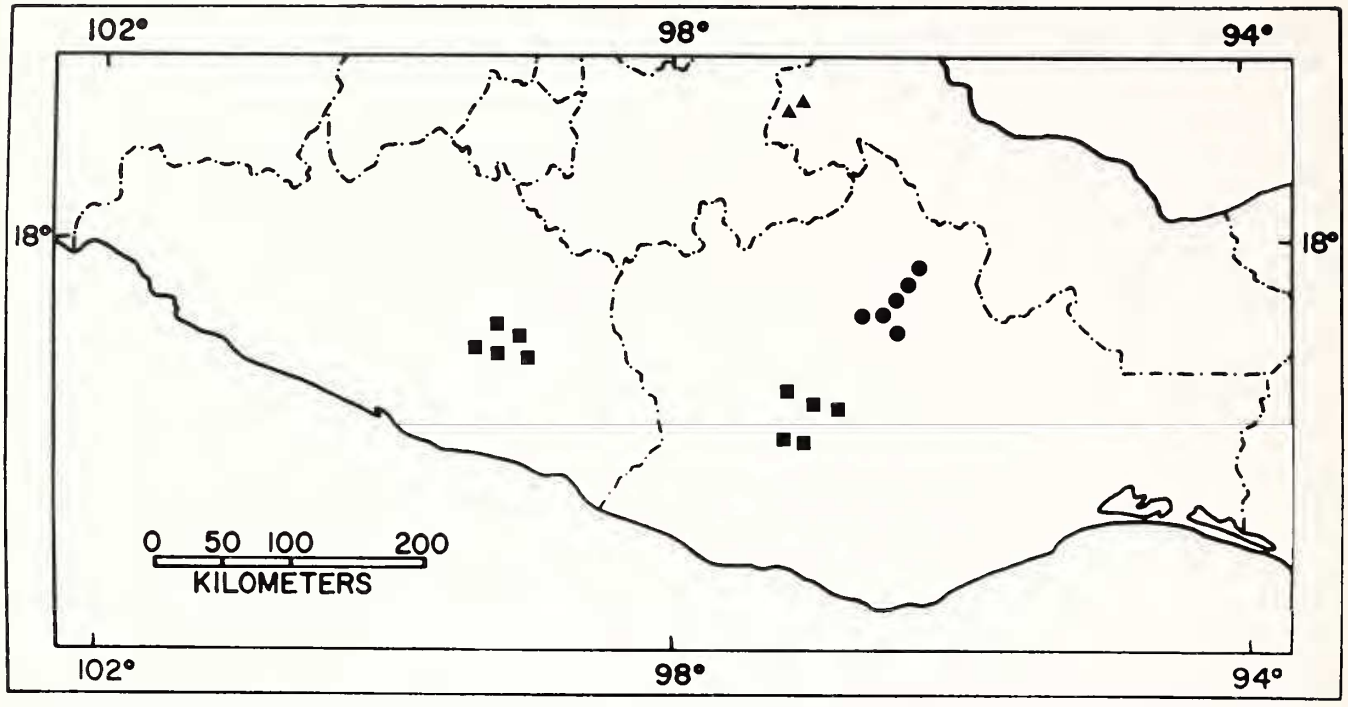

Figure 6. The geographical distribution of the three members of the *Barisia gadovi* species group (*antauges*—▲, *gadovi*—■, and *juarezi* new species—●). All three species occur principally in pine-oak habitats in portions of the Sierra Madre del Sur in Guerrero, Oaxaca, and Veracruz, Mexico.

the paler areas have an iridescent, metallic blue tinge. Rarely, a male will have more pale ventral pigment than dark. Females, on the other hand, have much paler iridescent blue-gray or cream venters, with mottling so diffuse that the venter is nearly uniform. Some dark mottling occurs in the gular region of some females, and occasionally large dark blotches occur on individual scales. In juveniles, the venter is dark brown, like the lateral surfaces, with heavy mottling. The gular region of juveniles is paler than the remainder of the venter, with distinct sublabial stripes, contiguous with the diagnostic supralabial bars.

In all individuals, the dorsal surfaces of the limbs and tail are the same as the dorsal ground color, and the ventral color of the appendages is that of the venter. Regenerated portions of autotomized tails are a much lighter brown or tan than the original portions of the tail, and the tail is frequently enlarged into a bulbous swelling at the point of regeneration.

COMPARISONS

The two species most similar to *B. juarezi* are the two other members of Tihen's (1949) *gadovi* group, *B. gadovi* Boulenger and *B. antauges* Cope [here including *B. modesta* (Cope) *fide* H.M. Smith, *in litt.*]. The *gadovi* group was defined by Tihen (1949) as *Barisia* having paired postmental scales and complete superciliary series. The other two species groups, *moreletii* and *imbricata,* have either single postmentals or incomplete superciliary series. The *gadovi* group occurs west of the Isthmus of Tehuantepec in the highlands of south-central Mexico (Fig. 6). Within the group, *B. juarezi* is most similar to *B. antauges* in size, color pattern of the head, and squamation. The following comparisons are based on the seven known specimens of *B. antauges* (see Specimens Examined, below). The maximum snout-vent length in *B. juarezi* (N = 95) is 77 mm (UTA R-8696) whereas the largest *B. antauges* (USNM 30221, holotype) is 85 mm. The number, placement, and variation in head scales are similar in both *B. juarezi* and *B. antauges.* There is a rosette of apparently homologous scales surrounding the interoccipital scale in both species. A postrostral scale is present in all specimens of *B. antauges* but is absent as a discrete medial scale in more than half (55.5%) of the specimens of *B. juarezi.* The presence of a single medial frontonasal and an anterior canthal on one or both sides is variable in both species. Additional shared similarities in head scales include: eight to 10 supralabials on each side; five or six superciliaries per side; two or three lateral supraoculars; five or six medial supraoculars; four or five primary and secondary temporals; and five to seven tertiary temporals (see Variation, above). In *B. juarezi,* the preocular is usually a large scale extending from the upper anterior portion of the orbit forward to the distinct loreal(s) and downward to the supralabials. The preocular in *B. antauges* is less distinct and usually fused with the lower and posteriormost loreal. The smooth dorsal scales are arrayed in 14 to 16 longitudinal rows.

The presence of smooth dorsal scales easily distinguishes both *B. antauges* and *B. juarezi* from the other group member, *B. gadovi,* which has acutely keeled middorsal scales.

Additional scale characteristics which differentiate *B. juarezi* from *B. gadovi* are: usually six (range 4–7) superciliaries in *B. juarezi* and usually four (range 3–5) in *B. gadovi;* the loreal is usually single on each side in *B. juarezi* and paired (upper and lower elements, with upper forming an anterior canthal) in *B. gadovi* (and *B. antauges*); *Barisia juarezi* has two or three suboculars, whereas *B. gadovi* has a single, elongate scale; and the longitudinal dorsal scale rows of *B. juarezi* number 14 (sometimes 16, see Variation, above) whereas there are usually 18 (oceasionally 16) in *B. gadovi.* The differences in color pattern of the side of the head (cheek) between *B. juarezi* and *B. gadovi* are distinct. In *B. gadovi,* there is a long, horizontal, white stripe on the supralabials extending from the angle of the jaw to the nostril. The face stripes are both light and dark and diagonal in *B. juarezi.* The most conspicuous similarity between *B. juarezi* and *B. gadovi* is the otherwise unique dorsal color pattern of posteriorly directed dark chevrons, most distinct in adult males (Fig. 4). These are not present in *B. antauges.*

Two other species of *Barisia,* each allocated to different species groups (Tihen, 1949), occur in the highlands of north-central Oaxaca. *Barisia imbricata* (of the *imbricata* species group) is known from several localities in the region (Guillette and Smith, 1982), including the Sierra Juarez. *Barisia viridiflava,* member of the *moreletii* group (Tihen, 1949), and *B. juarezi* are sympatric (see Habitat, below). *Barisia imbricata* is easily distinguished from *B. juarezi* by its large size (maximum SVL approximately 140 mm), low number (2–4) of superciliaries in incomplete series, rugose head scales deeply indented at sutures, acutely keeled middorsal scales in less than 45 transverse rows, and the lack of diagonal face stripes. More similar to *B. juarezi* is *B. viridiflava,* as borne out by the presence of many specimens of *B. juarezi* masquerading as *B. viridiflava* in some collections. Overall sizes of *B. juarezi* and *B. viridiflava* are similar (maximum SVL of *viridiflava,* 75 mm). The differences in color and pattern are distinct; *B. viridiflava* usually has at least one (middorsal) or three prominent longitudinal dark stripes in the paler brown dorsal area, whereas *B. juarezi* has dark chevrons. The light jaw stripe in *B. viridiflava* is horizontal and extends posteriorly from the loreals across the suboculars to the lower temporals. The middorsal scales of *B. viridiflava* are distinctly keeled, unlike *B. juarezi.* Most important of the scale differences is the single postmental, a character which is diagnostic for separating the *moreletii* and *gadovi* groups.

HABITAT AND BIOLOGY

Barisia juarezi occurs in cloud forest at elevations from 2000 to approximately 2800 m on the northern slopes of the Sierra de Juarez (Fig. 6). The cloud forest merges with pine-oak forest at elevations from 2800 to 3000 m on the summits and adjacent ridges. The dominant forest plant species are oaks (*Quercus* sp.), some pine (*Pinus ayachuite* and *Pinus* sp.), madrono (*Arbutus xalapensis*), sweetgum (*Liquidamber* sp.), and a tree fern (*Cyathea mexicana*). Epiphytic mosses, bromeliads, ferns, and orchids are abundant and dense on trees, and unlike the higher more open pine-oak forest, there is a dense understory consisting of small trees, shrubs, vines, and herbs. Second growth is dense in areas of fallen trees and lumbered clearings. Rain occurs in the habitat in all months but is heaviest during the period of June through October or November. Most of the precipitation comes from moisture-laden winds from the Gulf of Mexico.

Barisia juarezi is almost strictly terrestrial, occurring on the forest floor and in clearings, seeking refuge under rocks, logs, and in the leaf litter. Specimens caught on the surface were sunning or actively foraging in the patches of dappled sunlight penetrating the canopy.

Like congeners, *Barisia juarezi* is viviparous. A pregnant female (UTA R-8488) collected 7 April 1979, had three well-developed, pigmented embryos in the oviducts. The degree and pattern of pigmentation and size of these embryos was similar to those of the smallest field-collected individuals (25, 27, 28.5 mm SVL), indicating that they were nearly full-term. Additionally, several *B. juarezi* have given birth in captivity in our laboratory.

The female reproductive cycle apparently involves overwinter gestation, with parturition occurring in late spring, immediately prior to the summer monsoon season. Females attain sexual maturity at approximately 60 mm SVL, and enlarged ovarian follicles were present in a single female collected 2–3 April and seven collected in June and early July. Oviductal eggs (embryologic stage not determined but still largely yolk masses) were found in four females preserved in mid-July and August. A female collected in winter (early January) also contained large oviductal eggs. The smallest field-collected juveniles were obtained in early April, further corroborating pre-monsoon natality. Young-of-the-year, between 30 and 40 mm SVL, have been collected throughout the summer months.

Rainfall appears to modify substantially the seasonal activity of *B. juarezi.* Most specimens were collected during the wet season. In April 1979, a normal dry season, they were common in leaf litter and under surface rocks and logs. The soil was moist, indicating some recent rain. Following a severe drought across southern Mexico and a delayed monsoon in the winter of 1982–83, we found no specimens in early June 1983, and the soil was dry, even under surface objects.

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SPECIMENS EXAMINED

Barisia juarezi (paratypes, 94). MEXICO: Oaxaca; Ixtlan District; 51 km (by rd.) N Ixtlan de Juarez, LACM 15158; 54 km N Guelatao on Mex. Hwy. 175, 2510 m, LACM 122496; 60.3 km (34.7 mi. by rd.) NE Guelatao, Mex. Hwy. 175, 2316.5 m (7600 ft.), LACM 125365; 52.2 km (32.4 mi. by Hwy. 175) N Guelatao, 2515 m, LACM 129614–15; 55.6 km (34.5 mi. by Hwy. 175) N Guelatao, 12.6 km (7.8 mi. by rd.) NE jct. of rd. to Comaltepec, LACM 130271; 17.9 km (11.1 mi. by rd.) S Vista Hermosa, LACM 130272–84; 7.2 km (4.5 mi. by rd.) N Cerro Pelon, UTA R-3409-15, CAS 142597; 3.2 km (2 mi.) N Cerro Pelon, UTA R-3832; 9.4 km (5.8 mi.) N crest Cerro Pelon, UTA R-4309–17; 9.8 km (6.1 mi.) N crest Cerro Pelon, UTA R-4305–07, 4863–64; 10.5 km (6.5 mi.) N crest Cerro Pelon, UTA R-5803–06; 11.4 km (7.1 mi.) N crest Cerro Pelon, UTA R-5807–09; 9.7 km (6 mi.) N crest Cerro Pelon, UTA R-60996–100; 11 km (6.8 mi. by rd.) N Cerro Pelon, UTA R-7741, 7879, 8695–96; 10.2 km (6.3 mi.) N crest Cerro Pelon, UTA R-8425, 8430–32; 8.1–11.6 km (5–7.2 mi.) N Cerro Pelon, UTA R-8464; 6.1–11.6 km (3.8–7.2 mi.) N crest Cerro Pelon, UTA R-8484, 8486–95; 11.6 km (7.2 mi.) N crest Cerro Pelon, UTA R-8503–04, 8512–15; 12.1 km (7.5 mi.) N crest Cerro Pelon, UTA R-8511; ca. 16.1 km (10 mi.) SE Llano de las Flores, 2819.4 m (9250 ft.), AMNH 100711; 9.7 km (6 mi.) NE Cerro Pelon, 2194.6 m (7200 ft.), AMNH 100719; 61 km NE (by Mex. Hwy. 175) Guelatao, MVZ 112393; 52 km NE (by Mex. hwy. 175) Guelatao, MVZ 112394; Cerro Juarez, TCWC 36536–37; 10 km (6.2 mi.) NE Cerro Pelon, 52.4 km (32.5 mi.) SSW Valle Nacional, UMMZ 134015; 11.3 km (7 rd. mi.) NE Cerro Pelon, 2133.6 m (7000 ft.), UNM 25505; 4.8 km (3 mi.) E Cerro Pelon, UNM 30770–71; 11.9 km (7.4 mi.) E Cerro Pelon, UNM 30772–73; Vista Hermosa, Comaltepec, UCM 49305.

Barisia antauges (including *B. modesta,* 7). MEXICO: Veracruz; Pico de Orizaba, USNM 30221 (holotype), USNM 7084A–C (syntypes of *B. modesta*), CAS 98681, BMNH 1903.9.30.122, MBS 3685.

Barisia gadovi levigata (54). MEXICO: Oaxaca; Vic. Tejocotes, AMNH 102658–72, 102674–83, UNM 22756, 22781–82, UTA R-5793–98, LACM 102984–86, 121917–24, 121926; 13.2–15.5 km W (by rd.) San Vicente Lachixio, LACM 125366–67; 10.4 km WSW (by rd.) San Vicente Lachixio, LACM 129613, MVZ 164778; Sierra de Cuatro Venados, LACM 125368–69; 25–25.3 km (15.5–15.7 mi. by rd.) W Zaachila, LACM 129611–12.

Barisia gadovi gadovi (46). MEXICO: Guerrero; Omilteme (and vicinity), MCZ 42703–15, 96804, UNM 6016, 26444, TCWC 9900–08; Chilpancingo, KU 23792–94; 7.2 km (4.5 mi.) W Mazatlan, TCWC 9897–99, 11383–84, 11536; Asoleadero, 45 km (airline) WNW Chilpancingo, KU 105837–39; 6–12 km SW Filo de Caballo, KU 182656–64.

Barisia viridiflava (217). MEXICO: Oaxaca; Sierra de Juarez; Cerro Pelon, LACM 109296–99, 109384, 121931–37, CM 41256; 1.1 km (0.7 mi.) NE Cerro Pelon, LACM 121939–40, UTA R-5812–13, 7996, 8481–82; E Cerro Pelon, AMNH 98043; 49 km (by rd.) N Ixtlan de Juarez, LACM 15157; 49 km (by Mex. Hwy. 175) NE Guelatao, CAS 139904; 37 km (by rd.) N Guelatao, LACM 122500; 11.3 km (7 mi.) NNW Ixtlan de Juarez, CAS 87286, 87290; 14.5 km (9 mi.) NNE Guelatao, UTEP 5167; Cerro Humo Chico, UCM 38782–85, 44347–49; Llano de Las Flores, UMMZ 118808–09, 119631 (6), 124093, 125876 (4), AMNH 89647–51, 89827–30, 98044–45, UIMNH 60152–61, KU 70805–14; Llano de English, UIMNH 60137–51; 6.4 km (4 mi.) S Llano de las Flores, AMNH 89641–43, 90992–93, 90995, 100720; 11.8 km (7.3 mi.) NE Cerro Pelon, AMNH 102716; 8.7 km (5.4 mi. by rd.) N El Carrizal, AMNH 100717; 8.1 km (5 mi.) N El Carrizal, AMNH 102718–19, 102721–25; Cerro San Felipe, LACM 122497–99, 125372–77, UCM 41061–62, 48327–29, USNM 113220, UMMZ 126256 (5), 126257, 126258 (3), FMNH 99023–36, 112026, MVZ 112389–92, 140643–48, 162291–98, AMNH 90982–91, 103703, UNM 15495–504, UIMNH 60122–36; 12.9 km (8 mi.) W Cumbre del Estudiante, AMNH 97211; 2.4 km (1.5 mi.) N Campo Coconal, 27.4 km (17 mi. by rd.) NW Tamazulapan, LACM 131525–26; Mt. Zempoaltepec, LACM 15154–56, 62446, 130790, AMNH 90096, USNM 47184–85, 47599.

Barisia moreletii (5). MEXICO: Chiapas; 11 km (6.8 mi.) SE San Cristobal de las Casas, LACM 58102–04; 12.6 km (7.8 mi.) SE San Cristobal de las Casas, LACM 61209; 1.6 km (1 mi.) S San Cristobal de las Casas, LACM 74284.

Barisia imbricata (5). MEXICO: Oaxaca; 1 km (0.6 mi. by rd.) N Machin, 41.9 km (26 mi. by Mex. Hwy. 175) N Guelatao, LACM 130125; Veracruz; Pico de Orizaba, LACM 121929, 131443, 131445–46.

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