

## The taxonomic status of the Yucatán brown brocket, *Mazama pandora* (Mammalia: Cervidae)

Rodrigo A. Medellín, Alfred L. Gardner, and J. Marcelo Aranda

(RAM) Instituto de Ecología, UNAM, Apartado Postal 70-275, 04510 Distrito Federal, México;  
(ALG) Biological Survey, Patuxent Wildlife Research Center, Biological Resources Division, U.S.  
Geological Survey, National Museum of Natural History, Washington, D.C. 20560-0111, U.S.A.;  
(JMA) Instituto de Ecología, A.C., Km 2.5 Antigua Carretera a Coatepec, Xalapa,  
Veracruz, México

**Abstract.**—The Yucatán brown brocket deer, described as *Mazama pandora*, is now treated as a subspecies of either the common brown brocket *Mazama gouazoubira*, or of the red brocket *M. americana*. Analysis of brocket deer from México and Central and South America, reveals that the Yucatán brown brocket is sympatric with the red brocket in México and, while similar to *M. gouazoubira*, warrants recognition as a separate species.

Merriam (1901) described a brown brocket from the Yucatán Peninsula as *Mazama pandora*. Allen (1915) retained *M. pandora* as a species and aligned it with the brown brocket group. Gaumer (1917) treated *M. pandora* as a synonym of *Cariacus rufinus* (Bourcier & Pucheran 1852), variously considered either a red or a brown brocket. Tate (1939:226), believing that red brockets (his Division A [large brockets]) occurred only in South America, allied *M. pandora* with his Division B (small brockets) in which he included both "red" and "brown" species. Goldman & Moore (1945) listed *pandora* as a subspecies of the Mexican red brocket *M. sartorii* Saussure, 1860 (= *M. americana*), a taxon Tate (1939) had questionably equated with *M. tema* Rafinesque, 1817, (= *M. americana*) and included in his Division B group. Hershkovitz (1951) listed *pandora* as a subspecies of the common South American brown brocket *M. gouazoubira* (Fischer 1814). Miller & Kellogg (1955) and Hall & Kelson (1959) followed Hershkovitz's allocation and used the name combination *M. gouazoubira pandora*. Later, Hershkovitz (1966: 743, footnote) changed his mind and, having decided that the Yucatán brown brocket

was a color variant of the red brocket, said it "should be known as *Mazama americana pandora*." Genoways & Jones (1975) agreed, as did Hall (1981), Ramírez P. et al. (1986), and Grubb (1993). Czernay (1987) and Bisbal (1991), however, disagreed and treated *pandora* as an disjunct subspecies of *M. gouazoubira*.

As currently understood (Grubb 1993), *Mazama* is represented in México by a single species, the red brocket *M. americana* (Erxleben 1777), found in the states of Campeche, Quintana Roo, Yucatán, Chiapas, Oaxaca, Veracruz, Tamaulipas, and San Luis Potosí (Hall 1981, Ramírez P. et al. 1986, Grubb 1993). Hall (1981) recognized three subspecies in México: *M. a. pandora* in the northern Yucatán Peninsula, *M. a. cerasina* Hollister, 1914, in easternmost Chiapas (but did not cite a record), and *M. a. temama* Kerr, 1792, elsewhere in the country. *Mazama americana* also occurs southward through Central and South America to Argentina (Cabrera 1961, Eisenberg 1989, Emmons & Feer 1990, Redford & Eisenberg 1992). The only other brocket currently known north of South America is *M. gouazoubira permira* Kellogg, 1946, a brown brocket endemic to Isla

San José, one of the Islas Perlas in the Gulf of Panamá. *Mazama gouazoubira* is widespread in South America.

Recent field work on the Yucatán Peninsula (Fig. 1) has confirmed Czernay's (1987) and Bisbal's (1991) conclusion that both a red and a brown species of *Mazama* occur in México. Our analysis of specimens shows *pandora* (Fig. 2) to be a brown brocket that warrants recognition as a species distinct from *M. gouazoubira*.

### Materials and Methods

We examined 74 specimens of *Mazama* from México, Central America, Colombia, and Venezuela (Fig. 1). Specimens are deposited in three collections in México and four in the United States: Universidad Veracruzana (UV), Xalapa; Instituto de Biología (IBUNAM), Distrito Federal; Instituto Nacional de Investigaciones sobre Recursos Bióticos (INIREB), El Colegio de la Frontera Sur, San Cristobal de las Casas, Chiapas; American Museum of Natural History (AMNH), New York; Field Museum of Natural History (FMNH), Chicago, Illinois; Florida Museum of Natural History (UF), University of Florida, Gainesville; and National Museum of Natural History (USNM), Washington, D.C. The samples include the type specimens of *M. pandora* Merriam, 1901, and *M. [gouazoubira] permira* Kellogg, 1946.

We recorded body measurements (from label information) and 8 qualitative characters of the pelage and cranium, along with 14 cranial dimensions in females and 23 in males (Tables 1 & 2) as follows:

*Qualitative characters.*—1) color pattern (brown versus red); 2) insertion of antlers (parallel or U-shaped versus divergent or V-shaped); 3) condition of unworn antlers (fluted along total length versus either heavily rugose or ridged at the base, but otherwise relatively smooth); 4) shape of zygomatic arch in lateral view above glenoid fossa (elevated posteriorly versus broadly rounded); 5) nasals domed versus

straight in lateral profile; 6) shape of premaxillae (tapering anteriorly versus broad anteriorly); 7) shape of posterior margin of palate (mesopterygoid fossa U-shaped versus V-shaped); 8) presence and length of sulcus associated with supraorbital foramen.

*Measurements.*—External: Total length, tail, hind foot, ear, and mass (weight). Cranial (Table 2): Condylbasal length (CBL); condylo-premolar length (CPL); zygomatic breadth (ZB); maxillary toothrow (from anterior alveolar margin of first premolar to posterior alveolar margin of last molar; MAX); breadth of braincase (BBC); post-orbital constriction (POC); breadth of rostrum (width across rostrum at most vertical juncture of maxilla-premaxilla suture; BR); length of auditory bulla (LAB); width of auditory bulla (WAB); distance from posterior margin of orbit to posterior base of pedicel (DOP); maximum diameter of pedicel (DP); distance between pedicels (DPP); length of antlers (including pedicel; LA). We recorded other measurements including condylo-incisive length of mandible, condylo-premolar length of mandible, angular-coronoid height, height of pedicel, maximum diameter of antler above burr, maximum distance between antlers above burr, minimum distance between antlers above burr, distance between antlers points, as well as dimensions of premolars. However, we do not report them in this analysis because of their overall lack of diagnostic value within the focus of this report. We also do not compare the direction of nape hairs and the degree of tuft development on the forehead because too few skins of *pandora* were available to make these comparisons meaningful.

We segregated our sample into four groups: 1) 34 specimens from México, Central America, and Colombia having a red coat, V-shaped mesopterygoid fossa, and comparatively short, parallel antlers; 2) 7 *M. gouazoubira permira* from Isla San José, Gulf of Panamá; 3) 8 *M. gouazoubira* ssp. from Colombia and Venezuela; and 4)

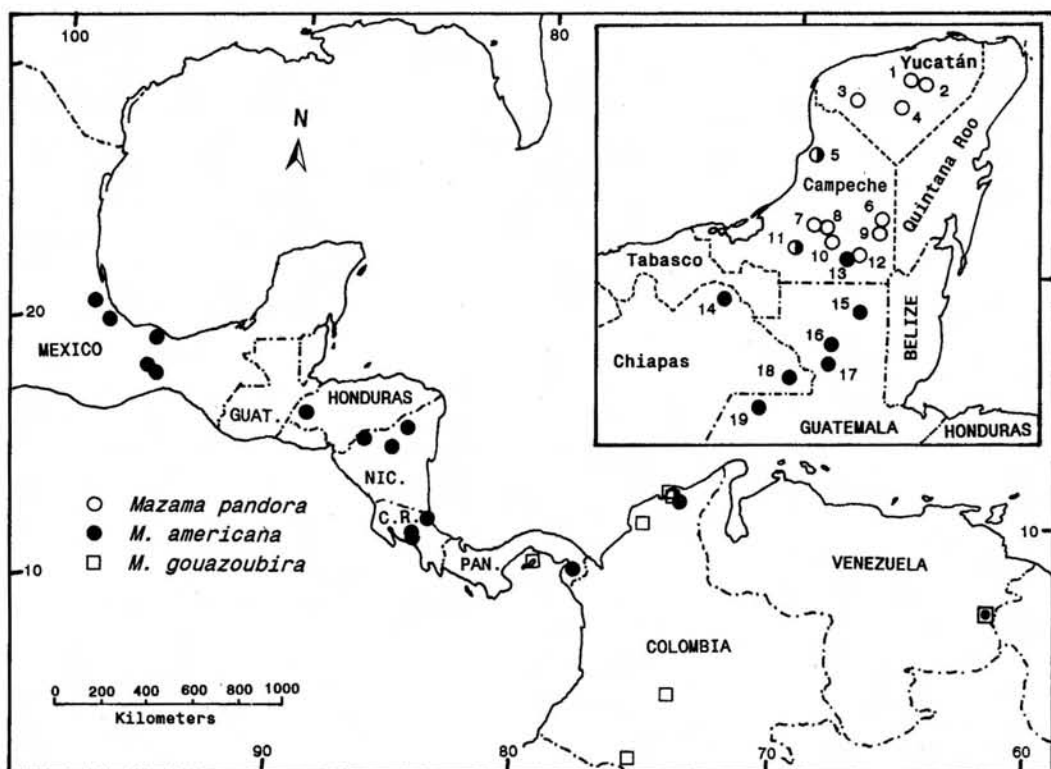


Fig. 1. Map of localities represented by specimens of *Mazama* spp. reported on here. Localities listed under Specimens Examined identified in sequence for each country (and for each State in México) from north to south, west to east. Numbered localities on inset of the Yucatán Peninsula and adjacent Guatemala and Chiapas, México as follows: Mexico, Yucatán—1) Tunkás, 2) Dzitás, 3) 10 km SE of Muna, 4) Tixcaltuyub; Campeche—5) Pokiazum [=Pocyaxum], 6) Ejido El Refugio, 7) Apazote, 8) 5 km W of Antigua Central Chiclera La Esperanza, 9) Ejido Nuevo Becal, 10) La Tuxpeña, 11) Central Chiclera Villahermosa, 12) 73 km SSW of Xpujil, 13) Calakmul; Chiapas—14) Palenque; Guatemala—15) Petén, Tikal, 16) Petén, La Libertad region, 17) Petén, Sayaxché; Mexico, Chiapas—18) Ejido López Mateos; Guatemala—19) Huehuetenango, Barrillas.

Table 1.—Comparison of selected qualitative characters of populations of *Mazama* spp. from México, Central America, Colombia, and Venezuela. See Materials and Methods for abbreviations and descriptions of character states; CA = Central America; SA = South America (Colombia and Venezuela).

Character	<i>M. pandora</i>	<i>M. americana</i>			<i>M. gouazoubira</i>	
		México	CA	SA	Panamá	SA
Color	gray-brown	red	red	red	gray-brown	gray-brown
Antlers						
insertion	divergent	parallel	parallel	parallel	parallel	parallel
unworn	fluted	rugose	rugose	rugose	ridged	ridged
ZA elevation	narrow arch	broad arch	broad arch	broad arch	broad arch	broad arch
Nasal profile	humped	straight	straight	straight	straight	straight
Premaxillae	broad	tapering	tapering	tapering	tapering	tapering
Palatal margin	10-U/1-V	V-shaped	12-V/2-U	V-shaped	V-shaped	V-shaped
SO sulcus	≥20 mm	≤20 mm	≤20 mm	variable	≤5 mm	≥20 mm



Fig. 2. Adult male *Mazama pandora* with moderately-worn antlers. Photographs by Oscar Moctezuma.

Table 2.—Selected measurements of population samples of *Mazama* spp. from México, Central America, Colombia, and Venezuela. See Materials and Methods for abbreviations and descriptions of measurements; CA&Col = Central America and Colombia; Col&Ven = Colombia and Venezuela; Ven = Venezuela. Sexes are combined except for postorbital constriction. Values are given as range over mean followed by sample size in parentheses.

Measurement	<i>M. pandora</i>	<i>M. americana</i>			<i>M. gouazoubira</i>	
		México	CA&Col	Ven <sup>a</sup>	Panamá	Col&Ven
CBL	161.3–177.0	162.0–171.0	156.8–180.0	208.9–209.5	156.2–171.2	159.0–176.0
	169.5 (8)	166.9 (4)	171.3 (10)	209.2 (2)	165.3 (3)	166.6 (8)
CPL	114.4–127.0	109.0–121.2	106.0–120.6	142.4–143.9	110.0–118.9	109.5–119.0
	120.5 (8)	114.7 (10)	115.3 (11)	143.2 (2)	115.0 (5)	112.9 (8)
ZB	70.9–84.5 <sup>b</sup>	73.6–86.5	73.0–90.8	90.9–97.2	68.8–74.6	69.8–80.0
	77.7 (13)	79.8 (13)	79.6 (13)	94.1 (2)	71.5 (4)	73.7 (8)
MAX	49.9–51.9	48.0–54.3		59.6–61.0	50.5	49.0
	50.6 (6)	50.9 (6)		60.3 (2)		
BBC	53.7–59.1	52.5–59.9	51.6–61.2	61.5–62.2	47.7–51.0	49.8–56.6
	55.7 (14)	56.1 (13)	56.4 (14)	61.9 (2)	49.9 (5)	53.2 (8)
POC–♂♂	59.1–70.2 <sup>b</sup>	46.5–61.2	46.6–55.5	52.1–59.3	43.8–47.5	44.5–56.7
	67.1 (7)	49.3 (14)	50.3 (7)	55.7 (2)	45.8 (3)	48.4 (4)
POC–♀♀	47.6–52.6	46.7–49.2	46.1–54.5		43.8–44.5	45.0–50.0
	49.6 (8)	48.2 (3)	49.2 (7)		44.2 (2)	47.2 (4)
BR	18.2–26.6	18.7–24.4	20.0–28.0	26.5–28.5	19.8–25.2	19.0–26.2
	22.3 (12)	21.6 (10)	22.9 (14)	27.5 (2)	22.1 (4)	21.6 (8)
LAB	23.6–26.6	20.0–23.4	20.3	23.8–26.6	17.6–19.4	21.3
	25.1 (6)	21.3 (5)		25.2 (2)	18.7 (3)	
WAB	10.4–12.4	8.7–10.3	9.5	8.6–10.9	8.1–9.1	10.1
	11.6 (6)	9.4 (5)		9.8 (2)	8.6 (3)	
DOP	34.9–41.6 <sup>b</sup>	33.4–47.1		47.7–49.5	33.8	43.4
	38.5 (5)	37.9 (5)		48.6 (2)		
DP	19.7–22.3	11.4–19.7		15.3–20.8	6.7	12.6
	21.1 (6)	14.0 (7)		18.1 (2)		
DPP	39.6–46.0	26.4–40.7		35.7–43.0		31.2
	43.2 (7)	32.0 (7)		39.4 (2)		
LA	112.4–142.0	50.4–91.1	81.1–96.0	106.4–129.8	50.5–69.0	54.7–71.3
	126.6 (6)	70.5 (10)	86.4 (3)	118.1 (2)	59.8 (2)	63.0 (2)

<sup>a</sup> Two large males (USNM 374880, 374883) identified as *M. americana shelia*.

<sup>b</sup> Sample includes one subadult male.

20 specimens from México having either a brown to grayish-brown coat, U-shaped mesopterygoid fossa, domed nasals, or long, divergent antlers (because most specimens were incomplete, specimens were assigned to this group on the basis of one or more of these features). Some specimens representing both groups 1 and 4 were from sympatric populations on the Yucatán Peninsula. Complete measurements are available for only a few specimens in each group because most specimens are incomplete; several are only skulls (some fragmented), and a few consist of only frontals with antlers.

In addition to these four samples we added two extremely large male red brockets from eastern Venezuela identified as *M. americana shelia* (see measurements in Table 2). These specimens provided additional means to compare and contrast the size of the auditory bullae and the size and length of antlers and pedicels between *pandora*, *americana*, and *gouazoubira*.

## Results and Discussion

Brockets in the first group clearly represent *M. americana* as the taxon is known today. All skins are reddish ventrally and

uniformly bright reddish dorsally. Skulls have a narrow, tapering rostrum (premaxillae); small (usually less than 20 mm in length) to obsolete sulci associated with supraorbital foramina (Fig. 3A); straight nasals (in lateral profile; Fig. 4A); narrow postorbital constriction; dorsal margin of squamosal root of zygoma broadly arched above glenoid fossa (in lateral profile; Fig. 5A); and predominately V-shaped mesopterygoid fossa (U-shaped in only 2 of 32 specimens with complete palates). In males, the pedicels are short and slender; antlers are either parallel or convergent and, in the unworn condition, moderately to extremely rugose at the base (Fig. 6A).

The second group comprises only *Mazama gouazoubira permira*. These are small deer having a grayish-brown coat, minute or absent supraorbital foramina and associated sulci, straight nasals (in lateral profile), narrow postorbital constriction, squamosal root of zygoma broadly arched above glenoid fossa (in lateral profile), and a V-shaped mesopterygoid fossa. Males have short, slender pedicels and short, straight, parallel antlers.

Group three consists of small to medium-sized Colombian and Venezuelan *M. gouazoubira*, which have a grayish-brown coat, narrow postorbital constriction, predominately V-shaped mesopterygoid fossa, straight to slightly and evenly convex nasals (in lateral profile; Fig. 4C), and broadly arched (in lateral profile; Fig. 5C) squamosal root of zygoma above glenoid fossa. Males have slender pedicels and short to long, straight antlers that are ridged at the base in the unworn condition. Both sexes have supraorbital foramina and associated sulci of variable size, but usually greater than 20 mm in length.

The fourth group consists only of brown brockets from the Yucatán Peninsula and represent the taxon described by Merriam (1901) as *M. pandora*. These deer are characterized by brown to gray-brown dorsal pelage and paler to whitish venters (Fig. 2); comparatively-broad, spatulate premaxillae;

broad postorbital constriction, especially in males (Table 2); posterior half of nasals conspicuously humped in lateral profile (Fig. 4B); large supraorbital foramina usually opening into prominent, long grooves (sulci usually longer than 20 mm, Table 2; Fig. 3B); posterior margin of palate predominantly U-shaped in outline (V-shaped in only 1 of 11 specimens where condition could be assessed); and dorsal margin of squamosal root of zygoma narrowly arched above glenoid fossa (Fig. 5B). Males have massive pedicels (Figs. 3B & 4B) and long, divergent, and usually curved antlers that may converge at the tips. The frontal region is broad in *M. pandora*, especially in males (Fig. 3B; compare values for postorbital constriction in Table 2). Bivariate diagrams (Fig. 7) of postorbital constriction plotted against breadth of braincase illustrate sexual dimorphism in these dimensions in *M. pandora*. Although these measurements of a subadult male (IBUNAM 38345) fall between the clusters of adult females and males, the postorbital constriction is clearly larger than that of the largest female in our sample. In contrast, the diagrams (Fig. 7) for *M. americana* and *M. gouazoubira* show no evidence of differences between the sexes in postorbital constriction.

*Mazama pandora* is larger than sympatric *M. americana*, and has a larger patch of longer dark stiff hairs on the forehead (Fig. 2). Males have heavier antlers that are fluted along almost the entire length in the unworn condition (Fig. 6B). The flutes in unworn antlers are separated by thin, sharp ridges; "deeply plicated or furrowed longitudinally" was how Merriam (1901:106) described them. The furrowed appearance is not always evident in heavily worn antlers.

Merriam (1901) described *M. pandora* as a "grayish or drab brown" brocket deer based on a male (holotype) from Tunkás, Yucatán, and a female from Apazote, Campeche. His description was accurate and emphasized the characteristics of color, width of forehead, configuration of zygo-

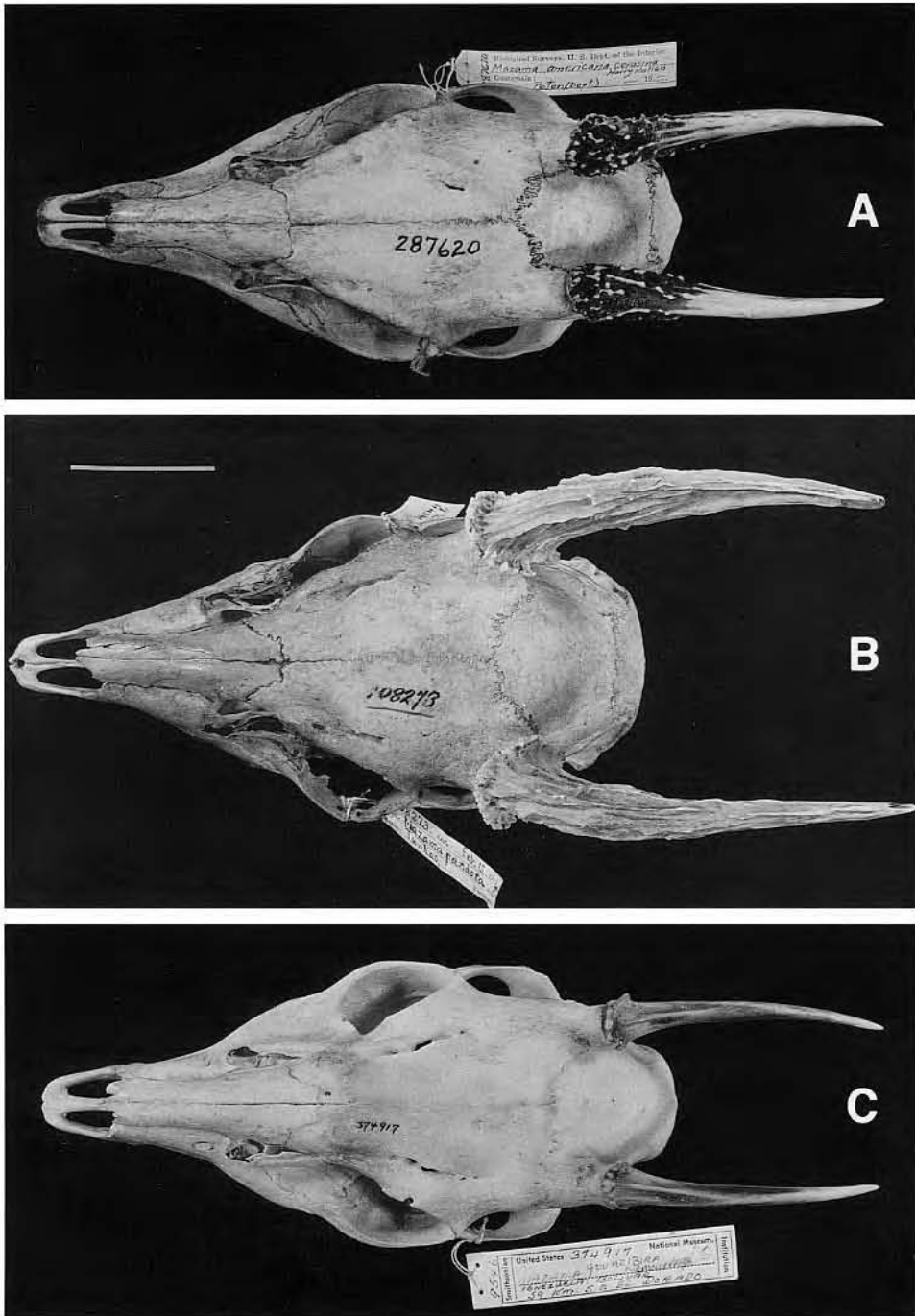


Fig. 3. Dorsal views of skulls of *Mazama*. A, *M. americana* (USNM 287620) from Petén, Guatemala; B, *M. pandora* (USNM 108273, holotype) from Yucatán, México; C, *M. gouazoubira* (USNM 374917) from Bolívar, Venezuela. Horizontal bar equals 40 millimeters.

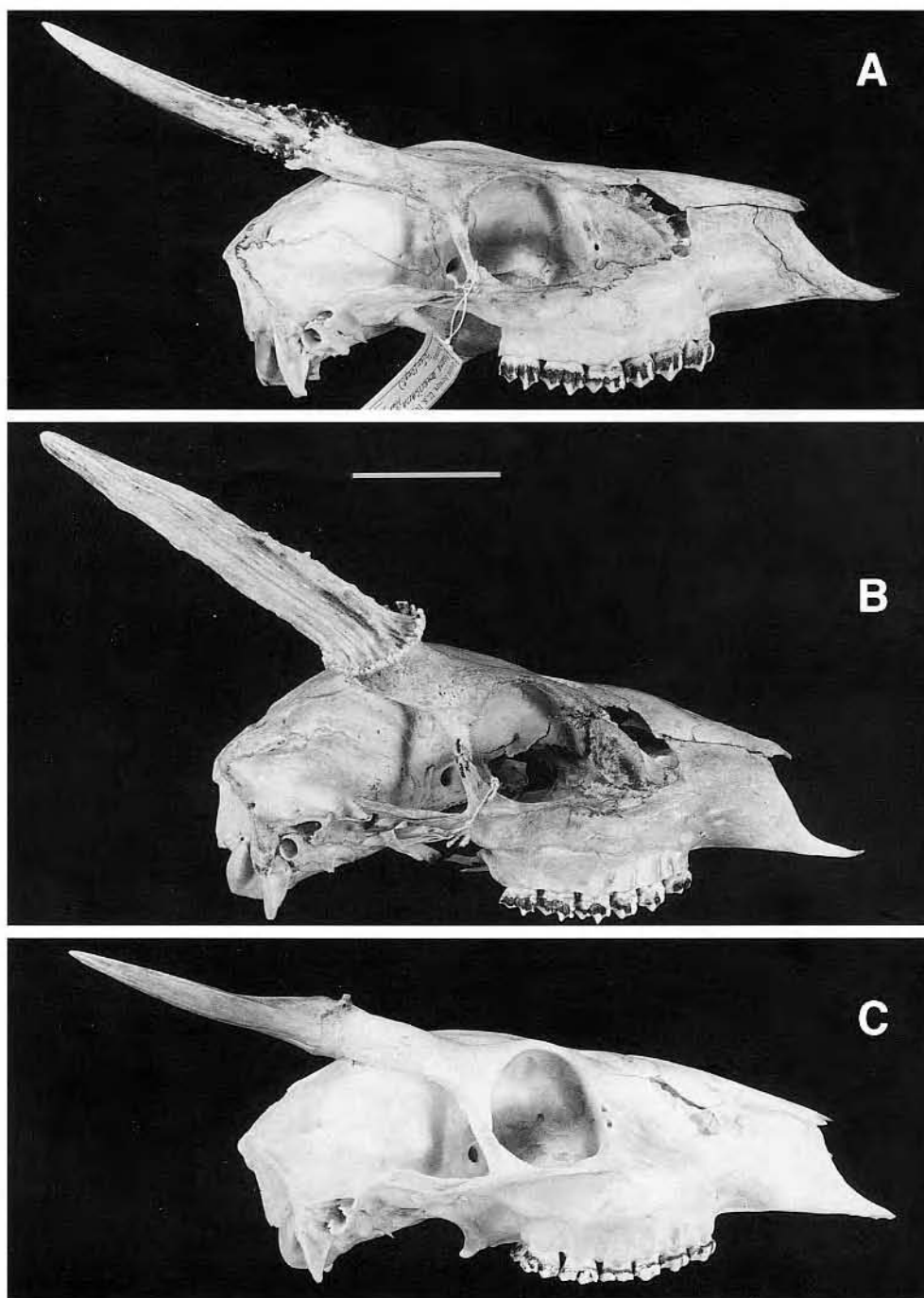


Fig. 4. Lateral views of skulls of *Mazama*. A. *M. americana* (USNM 287620) from Petén, Guatemala; B. *M. pandora* (USNM 108273, holotype) from Yucatán, México; C. *M. gouazoubira* (USNM 374917) from Bolívar, Venezuela. Horizontal bar equals 40 millimeters.



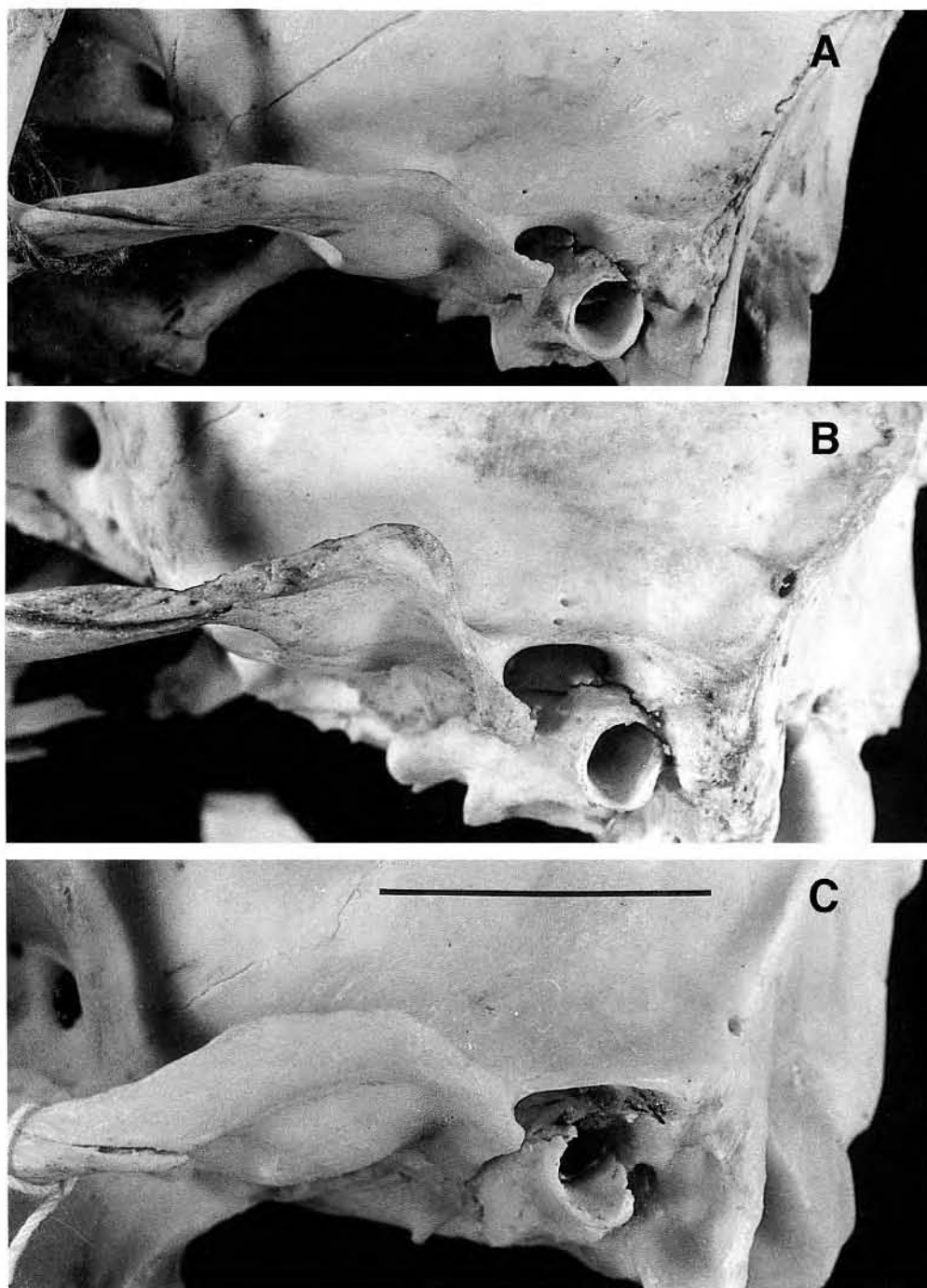


Fig. 5. Lateral view of squamosal region of skull of *Mazama* spp. showing the configuration of the zygomatic arch above the glenoid fossa. A. *M. americana* (USNM 287620) from Petén, Guatemala; B. *M. pandora* (USNM 108273, holotype) from Yucatán, México; C. *M. gouazoubira* (USNM 374917) from Bolívar, Venezuela. Horizontal bar equals 20 millimeters.

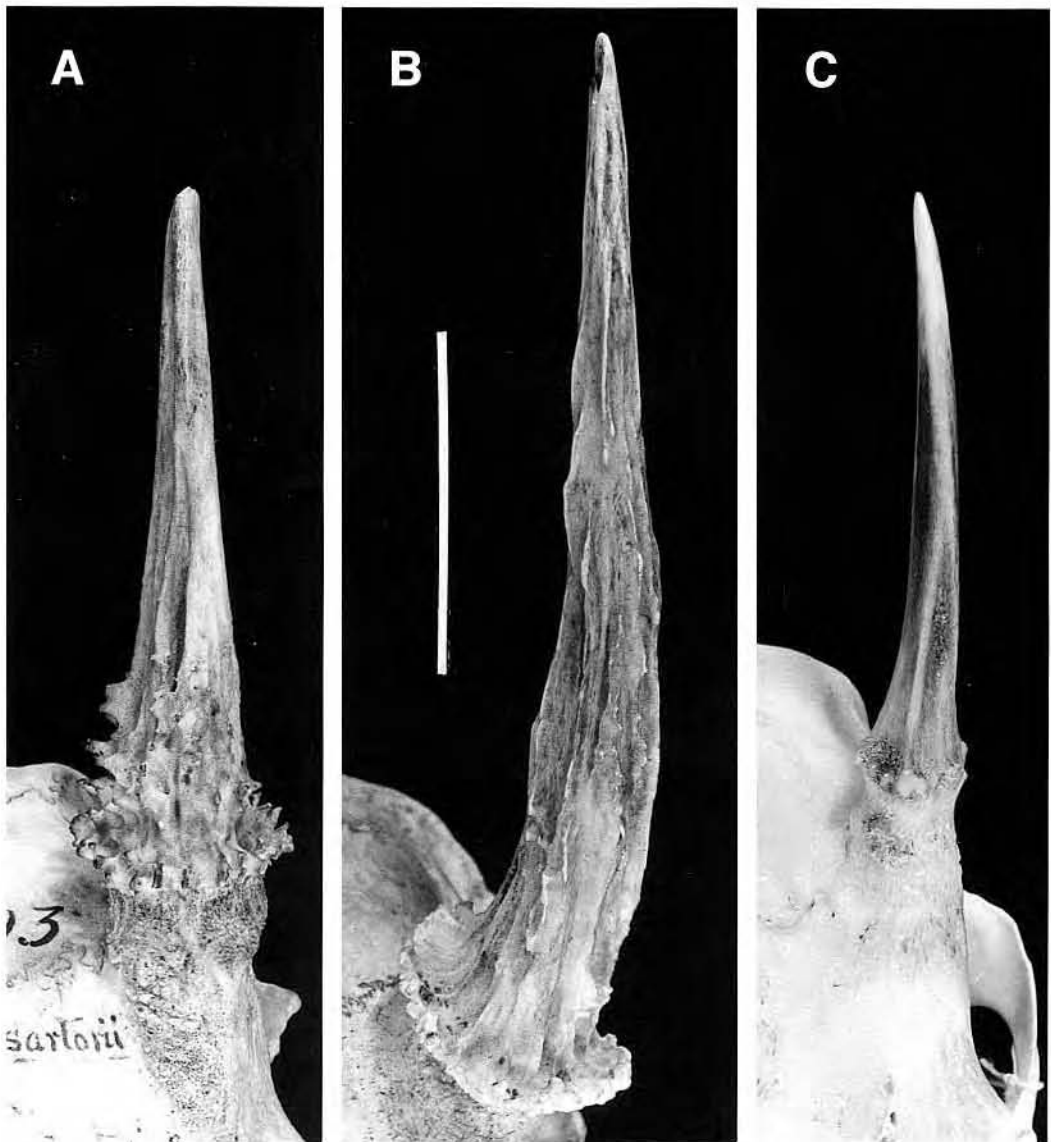


Fig. 6. Antlers of *Mazama* spp. A, Unworn antler of *M. americana* (USNM 6203) from Veracruz, México; B, unworn antler of *M. pandora* (USNM 108278, holotype) from Yucatán, México; C, moderately worn antler of *M. gouazoubira* (USNM 374917) from Bolívar, Venezuela. Vertical bar equals 40 millimeters.

matic arch above glenoid fossa, and the size and appearance of the antlers that we also found useful for distinguishing between *pandora* and other brocket deer. Merriam contrasted his new species with *M. sartorii* (= *M. americana*) and pointed out a number of cranial and dental features to distinguish the two, in addition to those cranial features we have mentioned here. Merriam (1901)

provided external measurements of the male holotype; to which we add external measurements (in mm) of another male, IBUNAM 38343 from Campeche: Total length 1120, tail 75, hind foot 262, ear 110; weight 21 kg.

Czernay (1987) and Bisbal (1991) are the only workers since 1959 who have treated *M. pandora* as a brown brocket (*M. goua-*

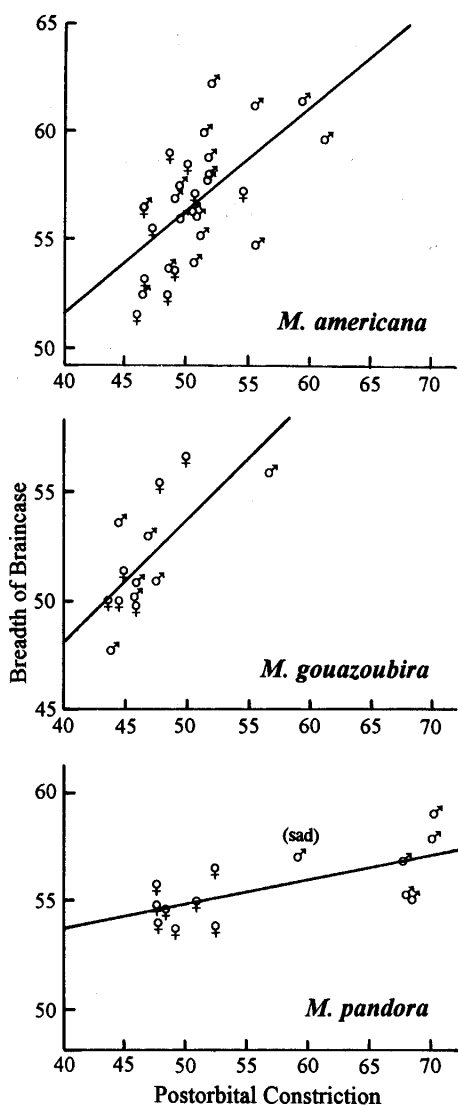


Fig. 7. Bivariate diagrams of postorbital constriction plotted against breadth of braincase in *Mazama americana*, *M. gouazoubira*, and *M. pandora*. The male (IBUNAM 38345) between the clusters of males and females in the plot for *M. pandora* is a subadult (sad).

*zoubira pandora*). The major similarity between *M. pandora* and *M. gouazoubira* is coat color. All other modern workers have treated *pandora* as a subspecies of *americana* following Hershkovitz (1966:743, footnote) who said, "The Yucatán Peninsula brocket is a red brocket and should be

known as *Mazama americana pandora*. Its generally brownish color (but not its color pattern), backwardly directed nuchal hairs, and small size misled authors, including myself, into regarding *pandora* as a race of the brown brocket, *Mazama gouazoubira*." Hershkovitz rationalized the grayish brown coat color by claiming that brown color variants are found throughout the range of the red brocket.

*Mazama pandora* and *M. americana* are sympatric in humid forest habitats at the base of the Yucatán Peninsula. While *M. americana* appears to be restricted to humid tropical forests, the Yucatán brown brocket also occupies more open and drier deciduous and thorn forest habitats of the northern Yucatán Peninsula. The Mayan Indians of the Yucatán Peninsula have long recognized the presence of a brown brocket distinct from the red species, as has the Club Safari International (A. Rivera, pers comm), and Mexican government officials who oversee hunting activity (J. M. Reyes, pers comm.).

Little is known about the biology of *M. pandora* other than what can be inferred by its distribution in arid habitats of the Yucatán Peninsula. The larger auditory bulla of *M. pandora* (contrast B with A & C in Fig. 8) may be correlated with the greater sound-carrying characteristics of more open habitats. Because sound frequencies carry farther in savannas and open-forest formations, *M. pandora* may have greater reliance on its hearing capability than is characteristic of *M. americana*, whose denser forest habitat of larger trees effectively dampens long-distance sound travel, especially during the warmer daytime.

*Remarks.*—Grubb (1993) used the spelling "*gouazoupira*," which is the original spelling used by Fischer (1814). Fischer described two brockets, *Cervus gouazoupira* and *Cervus gouazoupita* based, respectively, on the Guarani vernaculars Guazú-birá and Guazú-pitá used by Azara (1802) for Paraguayan brown and red brocket deer. Hershkovitz (1951), likely having assumed that Fischer's "*Gouazoupira*" was a lapsus

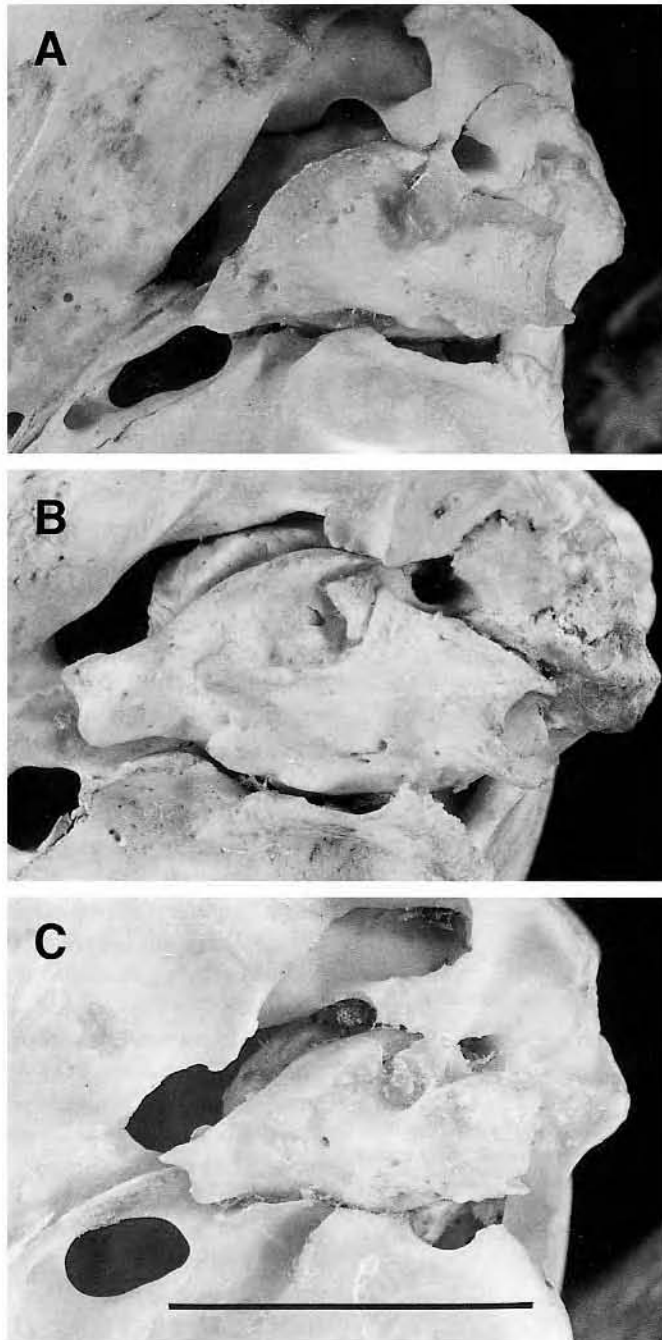


Fig. 8. Auditory bullae of *Mazama* spp. A, Right bulla of *M. americana* (USNM 287620) from Petén, Guatemala; B, left bulla (print made from reversed negative) of *M. pandora* (USNM 108273, holotype) from Yucatán, México; C, right bulla of *M. gouazoubira* (USNM 374917) from Bolívar, Venezuela. Horizontal bar equals 20 millimeters.

for *gouazoubira*, changed the spelling to *gouazoubira*, technically an unjustified emendation. With the exception of Grubb (1993), *gouazoubira* is the commonly-used spelling. A. L. Gardner (see BZN, 1996) has petitioned the International Commission on Zoological Nomenclature to validate Hershkovitz's (1951) emendation of the name. Therefore, the spelling *gouazoubira* is used in this report.

#### Specimens Examined

Localities for the following specimens plotted on map in Fig. 1 in the order listed below for each State in México, and for each country elsewhere. The geographic sequence is from north to south, west to east.

*Mazama americana* (36).—Mexico (19): Puebla, near La Aurora Mining Camp [plotted point in Fig. 1 is approximate] (AMNH 100193 ♂); Veracruz, Mirador (USNM 6007 ♂, 6201 ♂, 6202 ♂, 6203 ♂), Mirador Pilapa (UV 372 ♂, not plotted), Municipio Mecayapan, Ejido Santa Martha (UV 129 ♂, 131 ♂); Campeche, Pokiazum [=Pocyaxum] (IBUNAM 26395 ♂), Central Chiclera Villahermosa (IBUNAM 38352 ♂, 38353 ♂), Municipio Champotón, Zona Arqueológica de Calakmul (IBUNAM 37333 ♂); Oaxaca, Juchitán-Sarabia (AMNH 185273 ♂, 185274 ♀), San Miguel Chimalapa (IBUNAM 26392 ♂), locality unknown (AMNH 207449 ♀); Chiapas, Palenque (USNM 100418 ♀), Municipio Ocosingo, Ejido López Mateos, Río Lacantun (INIREB ♂), locality unknown (uncataloged UV ♂ from Zoológico Regional Miguel Álvarez del Toro, Tuxtla Gutierrez). Guatemala (5): Petén, Tikal (UF 6788 ♀), La Libertad region (USNM 287620 ♂), Sayaxche (UF 6795 ♂); Huehuetenango, Barrillas (AMNH 75137 ♂, 75138 ♀). Honduras (1): Lempira, Pucca [=Cerro Puca] (AMNH 130032 ♀). Nicaragua (4): Zelaya, Peña Blanca [=Peñas Blancas] (AMNH 29826 ♀); Madriz, San Juan [=San Juan Telpaneca, fide Allen, 1910] (USNM 29451 ♀); Matagalpa, Lavala [=Savala, see Allen 1915 for spelling; Jones & Genoways 1970 for location] (AMNH 28427 ♀, 28432 ♂). Costa Rica (3): Limón, Tortuguero (UF 13825 ♂); San José, Sabanillas de Pirris (FMNH 35173 ♂); Puntarenas, Pozo Azul (AMNH 19209 ♂). Panamá (1): Darién, El Reál (AMNH 37616 ♂). Colombia (1): Magdalena, Mamanacanaca (USNM 282137 ♀). Venezuela (2): Bolívar, 59 km SE of El Dorado (USNM 374880 ♂, 374883 ♂).

*Mazama gouazoubira permira* (7).—Panamá (5): Panamá, Isla San José (AMNH 144472 ♂, 144473 ♀; USNM 277144 ♂—holotype, 277145 ♂, 277146 ♀, 277147 ♂, 277148 ♀).

*Mazama gouazoubira* spp. (8).—Colombia (7): Magdalena, Guairaca [=Ensenada de Gayraca] (FMNH 13168 ♂), Bonda (FMNH 18800 ♀); Bolívar,

San Juan Nepomuceno (FMNH 68804 ♀); Meta, La Macarena, Río Guapaya (FMNH 87868 ♀, 87869 ♂, 87870 ♂); Putamayo, Río Mecaya (FMNH 70559 ♀). Venezuela (1): Bolívar, 59 km SE of El Dorado (USNM 374917 ♂).

*Mazama pandora* (20).—México (20): Yucatán, Tunkás (USNM 108273 ♂—holotype), Dzitás (USNM 269164 ♀), 10 km SE of Muna (IBUNAM 1625 ♀), Municipio Sotuta, Tixcacaltuyub, 100 km SE of Mérida (IBUNAM 38349 ♂, 38350 ♂, 38351 ♀); Campeche, Pokiazum [=Pocyaxum] (IBUNAM 26393 ♂, 26394 ♂), Municipio Hopelchén, Ejido El Refugio, 35 km NNE of Xpujil (IBUNAM 36707 ♂), Apazote (USNM 108287 ♀), Municipio Champotón, 5 km W of Antigua Central Chiclera La Esperanza (IBUNAM 26624 ♂, 26625 ♀), Municipio Hopelchén, Ejido Nuevo Becal (INIREB 9 ♂), La Tuxpeña (USNM 181263 ♀), Central Chiclera Villahermosa (IBUNAM 38343 ♂, 38344 ♀, 38345 ♂, 38346 ♀), 73 km SSW of Xpujil (IBUNAM 38347 ♂, 38348 ♂).

#### Acknowledgments

We thank G. Ceballos for suggestions on an earlier draft of this report. The following people provided information on and access to specimens in their respective institutions: B. D. Patterson, Field Museum of Natural History; R. Voss, American Museum of Natural History; L. Wilkins, Florida Museum of Natural History; F. Cervantes, Instituto de Biología, UNAM; and A. González, Universidad Veracruzana. We are grateful to J. Estudillo for access to the captive *M. pandora*, and to O. Moctezuma for photographing them. We also thank P. Leimgruber for his translation of the German text of Czernay's report. Partial funding for the research reported on here was received from Conservation International México and a grant to R. A. M. from the American Museum of Natural History.

#### Literature Cited

- Allen, J. A. 1910. Additional mammals from Nicaragua.—Bulletin of the American Museum of Natural History 28:87–115.
- . 1915. Notes on American deer of the genus *Mazama*.—Bulletin of the American Museum of Natural History 34:521–553.
- Azara, F. de. 1802. Apuntamientos para la historia natural de los cuadrúpedos del Paraguay y Río de la Plata. La Imprinta de la Viuda de Ibarra, Madrid, 1:xix + 1–318.

- Bisbal E., F. J. 1991. Distribución y taxonomía del venado Matacán (*Mazama* sp) en Venezuela.—*Acta Biológica Venezuelica* 13(1-2):89-104.
- BZN. 1996. Notices.—*Bulletin of Zoological Nomenclature* 53:145.
- Cabrera, A. 1961. Catálogo de los mamíferos de América del Sur.—*Revista del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Ciencias Zoológicas* 4(2):v-xxii + 309-732.
- Czernay, S. 1987. Die Spiesshirsche und Pudus. Die Neue Brehm-Bücherei, 84 pp.
- Eisenberg, J. F. 1989. Mammals of the Neotropics. The northern Neotropics. The University of Chicago Press, Chicago, 1:x + 1-449.
- Emmons, L. H., & F. Feer. 1990. Neotropical rainforest mammals: a field guide. The University of Chicago Press, Chicago, xvi + 281 pp.
- Fischer, G. 1814. Zoognosia tabulis synopticis illustrata. Quadrupedum reliquorum, cetorum et montrymatum descriptionem continens. Nicolai Sergeidis Vsevolozsky, Mosquae, 3:xxiv + 1-732.
- Gaumer, G. F. 1917. Mamíferos de Yucatán. Secretaría de Fomento, Mexico, frontispiece, xxii + 332 pp.
- Genoways, H. H., & J. K. Jones, Jr. 1975. Annotated checklist of mammals of the Yucatan Peninsula, Mexico. IV. Carnivora, Sirenia, Perissodactyla, Artiodactyla.—*Occasional Papers The Museum, Texas Tech University*, Number 26, 22 pp.
- Goldman, E. A., & R. T. Moore. 1945. The biotic provinces of Mexico.—*Journal of Mammalogy* 26:347-360.
- Grubb, P. 1993. Order Artiodactyla. Pp. 377-414 in *Mammal species of the World: a taxonomic and geographic reference* (D. E. Wilson, & D. M. Reeder, eds.). Smithsonian Institution Press, Washington, D.C., xviii + 1206 pp.
- Hall, E. R. 1981. The mammals of North America. 2nd ed. John Wiley and Sons, New York, 2:viii + 600-1182 + 90 pp.
- . & K. R. Kelson. 1959. The mammals of North America. The Ronald Press Co., New York, 2:x + 547-1084 + 79 pp.
- Hershkovitz, P. 1951. Mammals from British Honduras, Mexico, Jamaica, and Haiti.—*Fieldiana-Zoology* 31(47):547-569.
- . 1966. Mice, land bridges and Latin American faunal interchange. Pp. 725-751 in R. L. Wenzel & V. J. Tipton, eds., *Ectoparasites of Panama*. Field Museum of Natural History, Chicago.
- Jones, J. K., Jr., & H. H. Genoways. 1970. Harvest mice (genus *Reithrodontomys*) of Nicaragua.—*Occasional Papers of the Western Foundation of Vertebrate Zoology*, Number 2, 16 pp.
- Merriam, C. H. 1901. A new brocket from Yucatan.—*Proceedings of the Biological Society of Washington* 14:105-106.
- Miller, G. S., Jr., & R. Kellogg. 1955. List of North American Recent mammals.—*Bulletin United States National Museum* 205:xii + 1-954.
- Ramírez-P., J., M. C. Britton, A. Perdomo, & A. Castro. 1986. Guía de los mamíferos de México. Universidad Autónoma Metropolitana, México, D.F., 720 pp.
- Redford, K. H., & J. F. Eisenberg. 1992. Mammals of the Neotropics. The Southern Cone. The University of Chicago Press, Chicago, 2:x + 430 pp.
- Tate, G. H. H. 1939. The mammals of the Guiana Region.—*Bulletin of the American Museum of Natural History* 76:151-229.