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Artibeus planirostris. By Lydia Hollis

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Artibeus planirostris (Spix, 1823) Flat-faced Fruit-eating Bat

Phyllostoma planirostre Spix, 1823:66. Type locality "suburbiis Bahiae"; = Salvador, Estado da Bahia, Brazil (Carvalho 1965: 61).

Artibeus fallax Peters, 1865:355. Type locality "Guiana ... Surinam;" corrected to Suriname (Husson 1962:175).

Artibeus planirostris: Dobson, 1878:515. First use of current name combination.

Artibeus hercules Rehn, 1902:638. Type locality "Eastern Peru." Uroderma validum Elliot, 1907:537. Type locality "Cayenne, French Guiana."

CONTEXT AND CONTENT. Order Chiroptera, suborder Microchiroptera, family Phyllostomidae, subfamily Stenodermatinae, tribe Stenodermatini. Three subspecies of *A. planirostris* are recognized (Koopman 1978, 1982, 1993, 1994):

A. p. fallax Peters, 1865:355, see above; validum Elliot is a synonym.

A. p. hercules Rehn, 1902:638, see above.

A. p. planirostris (Spix, 1823:66), see above.

DIAGNOSIS. Artibeus planirostris (Fig. 1) is most likely to be confused with A. amplus, A. fimbriatus, A. jamaicensis, A. lituratus, and A. obscurus (Bárquez 1988; Eisenberg 1989; Handley 1987, 1989, 1991; Koopman 1978; Lim and Wilson 1993; Redford and Eisenberg 1992). A. planirostris is larger (length of forearm, 62–73 mm) than A. jamaicensis (length of forearm, 52.0–67.4 mm), and unlike A. jamaicensis, it possesses M3s and has faint, but always present, facial lines (Bárquez 1988; Koopman 1978, 1994; Ortega and Castro-Arellano 2001).

Artibeus lituratus has distinct supraorbital stripes and brownish fur (Jones 1978), whereas A. planirostris has ashy-brown dorsal fur and the base of the hairs on the shoulders are light gray. Tips of ventral hairs have a frosted appearance and faint streaks of gray hair dorsally (Redford and Eisenberg 1992). Facial stripes are less pronounced, ears are lighter in color, and wings are darker than in A. lituratus (Bárquez et al. 1993; Redford and Eisenberg 1992).

Unlike *A. amplus*, *A. planirostris* has white wing tips and a noseleaf that is separate from the upper lip and has a rim along its edge. In addition, *A. planirostris* has a less-developed rostrum; a more-developed coronoid processes; and a shorter, wider skull (Handley 1987; Lim et al. 2003; Lim and Wilson 1993).

Artibeus obscurus is much darker and has longer, softer fur than A. planirostris. In contrast to A. planirostris, postorbital constriction of A. obscurus is narrowest immediately behind the postorbital processes. Also, A. obscurus is distinct from A. planirostris by having zygomatic arches that diverge posteriorly (Handley 1989, 1991).

Compared with A. planirostris, A. fimbriatus has longer, softer fur, and is much darker (blackish rather than brownish—Handley 1989). Its extremities are hairier and lower rim of horseshoe of noseleaf is fused to lip. Rostrum is longer, broader, shallower, and flatter. A. fimbriatus has less-developed lachrymal and postorbital processes and ridges, M2 is larger, and M3 is absent (Bárquez et al. 1993; Handley 1989, 1991).

GENERAL CHARACTERISTICS. Artibeus planirostris is a relatively large bat. Specimens from Amazonian Ecuador and Peru (A. p. hercules) tend to be larger than those from the Guianas (A. p. fallax) and from Amazonian Brazil and Bolivia (Koopman 1978). Ears are short, with rounded tips (Bárquez et al. 1991; Dobson 1878). Tragus is short (Andersen 1908). A. planirostris (from northeastern Brazil) can be recognized by 2 or 3 lobes on hind edge of tragus (Handley 1989). Noseleaf is well developed, triangular, and its horseshoe is free mediobasally (Bárquez et al. 1991, 1993; Dobson 1878; Handley 1991; Lim and Wilson 1993). White facial stripes are faint (Anderson et al. 1982; Bárquez et al. 1991; Dobson 1878; Elliot 1907; Koopman 1994; Lim and Wilson 1993). Upper and lower lips are bordered by small warts and fringed internally with long horizontal papillae. Front of lower lip has 3 warts, arranged in a triangular shape and surrounded by 8 or 10 small warts (Dobson 1878).

Dorsal fur is soft, dense, and short (6–8 mm); color is brownish gray with some ashy or whitish hairs; ventrum is lighter and is gray (Bárquez et al. 1991, 1993; Dobson 1878; Elliot 1907; Handley 1991; Koepcke and Kraft 1984; Lim and Wilson 1993). Pelage color varies with age: dark and dull smoky brown in immature animals and lighter ashy brown in mature ones (Andersen 1908). Wings are blackish brown or dark brown with white tips (Bárquez et al. 1993; Elliot 1907; Koepcke and Kraft 1984; Lim and Wilson 1993). The nearly naked uropatagium is well developed but an external tail is absent (Bárquez et al. 1991, 1993; Dobson 1878; Handley 1991; Koepcke and Kraft 1984; Koopman 1994).

Body mass is 40–69 g (Bárquez et al. 1993). Ranges of selected external and cranial measurements (in mm) are as follows (n = 7 studies; males and females not separated): length of forearm, 62–73; length of ear, 15–26; total length, 75–110; length of hind foot, 12–25; length of lancet, 9.8–11.5; width of lancet, 7–9; width of horseshoe, 8.3–9.8; length of tragus, 7.2–8.5; interfemoral length, 16.0–20.5; length of tibia, 22–26; length of calcar, 6.5–8.2; greatest length of skull, 29.2–33.0; zygomatic breadth, 17.3–20.9;

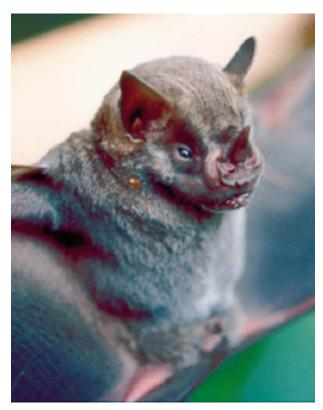


FIG. 1. Photograph of a male *Artibeus planirostris*. Photograph by B. K. Lim.

width of postorbital constriction, 7.0–8.1; breadth of braincase, 12.0–14.6; height of braincase, 11.8–13.8; rostral length, 10.0–15.1; mastoid breadth, 14.8–18.0; length of maxillary toothrow, 10.5–12.0; maxillary width across M1, 8.5–15.0; length of mandibular toothrow, 21.2–23.5; height of mandible at coronoid process, 8.1–10.1; skull across cingula of canines, 8.6–9.8; length of upper toothrow, C–M2, 10.4–12.2; length of lower toothrow, c–m3, 11.7–13.0; length of ear-conch, inner margin, 16.0–17.5; length of ear-conch, outer margin, 21–24; width of ear-conch, 14.5–16.5; inter-orbital width, 7.4–9.6 (Andersen 1908–A. p. fallax; Bárquez et al. 1993; Guerrero et al. 2003; Koepcke and Kraft 1984; Koopman 1994; Lim 1997; Lim and Wilson 1993).

Measurements (in mm) of external and cranial features of a female *A. planirostris* from Demerara, Guyana, are as follows: length of forearm, 66; length of ear, 14; total length, 81.3; length of hind foot, 16.5; length of lancet, 12.7; width of lancet, 7.6; length of tragus, 7.1; interfemoral length, 17.8; length of tibia, 24.1; greatest length of skull, 30.5 (Dobson 1878).

External and cranial measurement (in mm) of a male A. planirostris (listed as Uroderma validum) from Cayenne, French Guiana, are as follows: length of forearm, 67; length of ear, 22; total length, 88; length of hind foot, 17; length of tibia, 25; occipitonasal length, 27; basilar length of Hensel, 13; zygomatic breadth, 19.5; interorbital width, 8; height of braincase, 12; palatal length, palatal arch to base of incisors, 12; palatal width, P3–M1, 8; length of upper molar series, 9; inside length of M1, 4.5; crown width, 3; inside length of M2, 4; length of mandible, 21; length of low molar series, 11; alveolar length of M1, 3; alveolar length of M2, 2.5; height from ramus to top of coronoid process, 9.5; condyle width, at alveolar border of ramus, 7 (Elliot 1907).

Wing measurements (in mm) are as follows (n = 2 studies; males and females not separated): length of pollex, 14.2–17.2; length of metacarpal III, 53.5–67.6; length of metacarpal IV, 52.8–64.2; length of metacarpal V, 54.2–66.0; length of phalanx 1, digit III, 17.8–22.0; length of phalanx 2, digit III, 27.5–35.3; length of phalanx 3, digit III, 15.8–19.8; length of phalanx 1, digit IV, 15–19; length of phalanx 2, digit IV, 20–26; length of phalanx 1, digit V, 11.8–15.0; length of phalanx 2, digit V, 14.7–17.8 (Andersen 1908; Koepcke and Kraft 1984).

Wing measurements (in mm) of a female *A. planirostris* from Guyana are as follows: length of pollex, 15.2; length of metacarpal III, 58.4; length of metacarpal IV, 57.2; length of metacarpal V, 58.4; length of phalanx 1, digit III, 20.3; length of phalanx 2, digit III, 30.5; length of phalanx 3, digit III, 22.9; length of phalanx 1, digit IV, 17.8; length of phalanx 2, digit IV, 22.9; length of phalanx 1, digit V, 12.7; length of phalanx 2, digit V, 17.8 (Dobson 1878).

Skull of A. planirostris is broad and short (Fig. 2); rostrum is short and arched (Dobson 1878; Koopman 1994). Preorbital and postorbital processes are poorly developed; postorbital constriction and orbitonasal shield are broad (Bárquez et al. 1993; Handley 1991; Koepcke and Kraft 1984; Koopman 1994; Patten 1971). Nasals are tubular (Patten 1971). Two small infraorbital foramina are located above each other; distance between eyes exceeds distance between eye and end of muzzle (Dobson 1878). Third upper molar is normally present (Koepcke and Kraft 1984; Koopman 1994).

DISTRIBUTION. Artibeus planirostris ranges from southeastern Colombia and southern Venezuela (Lim 1997), south to northern Argentina and east to eastern Brazil (Fig. 3; Koopman 1982, 1993, 1994). In southern South America it is found in eastern Paraguay and northwestern Argentina, south of the Orinoco River (Honacki et al. 1982; Lim 1997; Redford and Eisenberg 1992). Although no distinct geographical separation exists for the subspecies, they are generally distributed as follows: A. p. hercules in eastern Ecuador and Peru, A. p. planirostris in eastern Brazil and Paraguay, and A. p. fallax in most of the remaining area (Fig. 3; Koopman 1994). Specimens from Bolivia are referred to A. p. fallax (Anderson et al. 1982).

In the Amazonian lowlands and highlands of Peru, A. planirostris occurs between 650 and 1,400 m (Koopman 1978). Altitude ranges from sea level to 1,660 m have been reported (Eisenberg 1989; Koopman 1978). The highest localities in Bolivia and Peru are 1,350 and 2,000 m, respectively (Anderson et al. 1982). No fossils are known.

FORM AND FUNCTION. A study on the ultrastructure of secretory cells in *A. planirostris* revealed a "conserved" parotid



FIG. 2. Dorsal, ventral, and lateral view of skull and lateral view of mandible of a male *Artibeus planirostris* (Royal Ontario Museum, ROM 50222, from Salto La Caldera, Argentina). Greatest length of skull is 30.4 mm. Photographs by M. B. Fenton.

gland (Tandler et al. 1997:186). The secretory cells contain large numbers of seromucous granules that are devoid of substructure. Some granules contain a number of concentric membranes with circular profiles inserted between the concentric membranes. The parotid gland acini of *A. planirostris* are similar to those of *A. amplus*, *A. cinereus*, *A. concolor*, *A. jamaicensis*, *A. lituratus*, and *A. obscurus* (Tandler et al. 1997).

Dental formula is i 2/2, c 1/1, p 2/2, m 3/3, total 32 (Andersen 1908; Handley 1991). Inner pair of upper incisors are bifid, vertically directed, and have broad slightly convex cutting edges (Dobson 1878). Two cusps are about equal in length and lower one-half of crown is chisel-shaped (Andersen 1908). Outer pair of upper

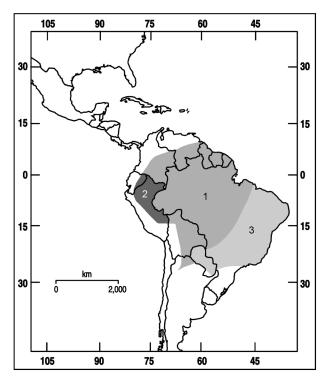


FIG. 3. Geographic distribution of *Artibeus planirostris*: 1, *A. p. fallax*; 2, *A. p. hercules*; 3, *A. p. planirostris* (modified from Koopman [1982], Lim [1997], and Redford and Eisenberg [1992]).

incisors are broad but very short; cutting edge is simple; oblique crowns face inward and forward; front and hind face are concave; 4 lower incisors are ca. equal in size and not grooved; front face is slightly concave (Andersen 1908; Dobson 1878).

Upper canines are very long, lacking a basal cusp; hind margin is sharp; inner margin is rounded; lingual face is almost flat; and cingulum is low and forms a shelflike projection on lingual face (Andersen 1908; Dobson 1878). Lower canines are very long; a small posterior basal cusp is present; and cingulum is same height as cutting-edges of incisors on inner margin and forms a shelflike projection at base of hind margin (Andersen 1908).

Crown of P1 is oblique, directed forward and downward, with a posterior and external basal cusp (Dobson 1878). Lingual cingulum has a concave projection or heel; anterior margin of heel is high, prominent, and sharp (Andersen 1908). P2 is longer at base, and much higher and broader than 1st upper premolar; base is concave and projects internally; 2 small posterior basal cusps are present (Dobson 1878). Lingual cingulum is a broad heel, with a deep, pitlike impression; anterior margin of heel is high, prominent, and sharp; on anterointernal margin of heel is a small, triangular, blunt cusp; 1st lower premolar is small, triangular, and slightly longer than high; lingual cingulum is slightly expanded (Andersen 1908). Second lower premolar is similar in size and shape to P2; a posterior obtuse basal cusp is present; lingual portion is low; and cingulum is larger than in p1 (Andersen 1908; Dobson 1878).

M1 is very broad and shorter at lingual than at labial margin (Andersen 1908). In occlusal view, posterior margin is concave; hypocone lacks a cingulum, is pointed (not evenly rounded) and apex is displaced posteriorly; paracone and metacone lobes are similar in size, with paracone being slightly taller than metacone (Patten 1971). Lingual portion forms a large crushing surface (Andersen 1908).

M2 is relatively large and broader than long, but not as broad as the 1st upper molar (Andersen 1908). M2 is appressed against M1 and posterior edge is notched (Patten 1971). Protocone and hypocone are fairly prominent; protocone is not divided from anterior cingular edge; metacone and metaconule are not distinct lobes (Patten 1971). M3 is reduced, as small as a lower incisor (Andersen 1908; Dobson 1878). M3 touches hypocone of M1 (Patten 1971). First lower molar is longer than broad and sharply narrowed in front; m2 is slightly smaller than m1, subrectangular, and slightly longer than broad; cingulum has a very small supplementary cusp (Andersen 1908). Third lower molar is very small, circular, and ca. one-eighth to one-tenth size of m2 (Andersen 1908; Dobson 1878).

ONTOGENY AND REPRODUCTION. In northeastern Brazil (Caatingas and Cerrado biomes), *A. planirostris* (listed as *A. jamaicensis* but considered to be *A. planirostris* by Willig and Mares [1989]) exhibits seasonal bimodal polyestry (Willig 1985). Peaks in parturition (from June or July to March) and lactation (October–December and January–March) correspond with the wet season, when food abundance is highest (Willig 1982). Independent juveniles 1st appear at the beginning of the wet season (December–January), and then again (a 2nd litter) at the end of the wet season in March (Willig 1985).

Artibeus planirostris may be able to produce young at any time throughout the year (Graham 1987). Females from São Paulo, Brazil, were estimated to be pregnant year-round (Taddei 1976). Pregnant females from Brazil have been captured in December and January (da Silva et al. 2001). Females from Peru were pregnant in April, June–September, and November–January and had small embryos in August and early November (Davis and Dixon 1976; Graham 1987). One lactating female was identified in March and females with juveniles were reported in both October and November from Peru (Graham 1987). Flat-faced fruit-eating bats were reproductively inactive at Salta, Argentina, in mid-May, and at the end of June at Jujuy, Argentina, but all females were reproductively active in mid-November at Salta (Bárquez 1988). Females with an open vagina were captured in mid-February (Jujuy) and early July (Tucuman) from Argentina (Mares et al. 1995).

Scrotal males were recorded in mid-February (Jujuy), early July (Tucuman), mid-October (Tucuman), and mid-November (Salta) from Argentina (Bárquez 1988; Bárquez et al. 1991; Bárquez and Ojeda 1992; Mares et al. 1995). Epididymal sperm was reported in 35 males throughout the year in São Paulo, Brazil (Taddei 1976).

Gestation is >3.5 months. The ovary remains functional during pregnancy and new ovulation can occur after birth (Taddei 1976). A. planirostris from Peru and Brazil were simultaneously lactating and pregnant in November and December (Graham 1987; Taddei 1976).

Forty-nine female *A. planirostris* from Peru had 1 embryo each (Graham 1987). In 3 female *A. j. planirostris* obtained from Brazil, 1 young had 1 follicle with 3 oocytes in 1 ovary (December), a nonpregnant adult had a follicle with 2 oocytes (March), and another had several follicles with 2 oocytes (April—Taddei 1976).

ECOLOGY AND BEHAVIOR. In Guyana, A. planirostris was abundant in roofs of houses and sugar factories during the late 1800s (Dobson 1878). More recently, 3 A. planirostris were captured from Jujuy, Argentina, in Yungas forest, where the dominant trees were laurel (Phoebe porphyria), nogal (Juglans australis), and palo blanco (Calacophyllum multiflorum), and 2 A. planirostris were captured from Tucuman, Argentina, in montane transitional forest surrounded by Chacoan vegetation (Bárquez and Ojeda 1992; Mares et al. 1995). A. planirostris inhabits mainly transitional forest and moist lower montane forest in Tucuman, Argentina (Bárquez et al. 1991). In Brazil, Ecuador, and Peru, A. planirostris is found in lowland tropical rain forest (Eisenberg 1989).

In the Chapada do Araripe of northeastern Brazil, A. planirostris (listed as A. jamaicensis) is abundant and ubiquitous in Cerrado (open tree and shrub woodland with a pervasive grass component) and Cerradão (stands with many trees, few shrubs, and little grass) habitats (Mares et al. 1981; Willig 1986; Willig and Mares 1989). This species is present throughout the Caatingas (assemblages of xeric-adapted plants) but most abundant on, or near, serrotes (relatively flat terrain with a large number of small granitic mountains). A. planirostris is found in all other major vegetation zones (Mares et al. 1981; Willig 1983, 1986). The proportion of males is not equal to the proportion of females in the Caatingas and Cerrado biomes; 28% of 204 captured adults and 40% of 270 captured adults, respectively, were males (Willig 1983).

Artibeus planirostris roosts in trees and has been captured close to several fruit-bearing trees including Ficus, Inga marginata (Mimosaceae), and Pourouma cecropiaefolia (Moraceae—Bárquez et al. 1991, 1993; Davis and Dixon 1976). A. planirostris also was captured just above the water of a narrow river in the transitional woodlands of Argentina (Bárquez 1988). The flat-faced fruiteating bat is active throughout the night (Davis and Dixon 1976). Of 8 *A. planirostris* collected in a house and forest at Santa Cruz, Bolivia, 1 specimen had 2 minute juvenile cestodes from the genus *Vampirolepis* (Sawada and Harada 1986).

Artibeus planirostris from edaphic Cerrado habitats on the Chapada do Araripe in northeastern Brazil specializes on the fruit of Vismia (Pichirina tree, Clusiaceae), which constitutes the bulk (80%) of the diet (Willig 1983; Willig et al. 1993). No significant dietary differences exist between wet and dry seasons in this area and insect consumption is minimal. Although the diet is predominantly fruit, some individuals consume arthropods, including beetles (Coleoptera), Diptera, Hymenoptera (worker ants [Formicidae]), and mites (Acari); accidental ingestion of mites and ants on the fruits may occur (Willig et al. 1993).

Artibeus planirostris and A. obscurus were caught together in a primary rain forest and on an adjacent cattle farm and A. planirostris was captured with A. lituratus at clearings near the edge of the forest in Amazonian Peru (Koepcke and Kraft 1984).

GENETICS. Artibeus planirostris has a diploid number of 30 for females and 31 for males and a fundamental number of 56; the X chromosome is subtelocentric and the Y chromosome acrocentric; 28 autosomal pairs correspond to 11 biarmed and 3 subtelocentric chromosome pairs (de Souza and de Araújo 1990; Gardner 1977). Occasionally a secondary constriction occurs on the short arms of these subtelocentrics (de Souza and de Araújo 1990). C-bands indicate that pericentromeric location of constitutive heterochromatin in the autosomes and in the X is common in A. planirostris. However, additional C-band blocks occur in A. planirostris; 3 pairs (1, 2, and 3) with an interstitial band on their long arms and, in addition, telomeric blocks on the short arms of pairs 5, 6, 7, 9, and 13; pairs 5, 6, and 7 have nucleolar organizer regions (NORs) on the short arms in regions corresponding to secondary restrictions of these subtelocentric chromosomes (de Souza and de Araújo 1990). Intraindividual variation occurs in the distribution of NORs; G-banding patterns of A. planirostris are similar to those of A. cinereus, A. lituratus, and S. lilium (de Souza and de Araújo 1990).

Artibeus planirostris may be an ancestral form of A. jamaicensis schwartzi from the Lesser Antillean island of St. Vincent (Pumo et al. 1996). Parsimony with bootstrap analyses ally the mitochondrial DNA of A. planirostris from French Guiana with the mitochondrial genome of A. j. schwartzi; similarities occur between the 12S rRNA sequences isolated from A. planirostris and A. j. schwartzi (Pumo et al. 1996).

An albino *A. planirostris*, with white fur and skin and red eyes, was reported in the urban environment of Fortaleza, north-eastern Brazil (Uieda 2000).

REMARKS. Inconsistent taxonomy has confused the systematic relationship between *A. planirostris* and *A. jamaicensis* (Lim et al. 2004). Although many authors consider *A. planirostris* distinct from *A. jamaicensis* (Bárquez 1988; Bárquez et al. 1991, 1993; Davis and Dixon 1976; Guerrero et al. 2003; Koepcke and Kraft 1984; Koopman 1982; Lim 1997; Lim et al. 2003, 2004; Lim and Wilson 1993; Owen 1987, 1988; Redford and Eisenberg 1992; Van Den Bussche et al. 1998), some authors regard *A. planirostris* as a subspecies of *A. jamaicensis* (Handley 1987, 1989, 1991; Jones and Carter 1976, 1979; Marques-Aguiar 1994; Simmons and Voss 1998; Taddei 1976).

Without supporting data, Handley (1987, 1989) considered the smaller northern *A. jamaicensis* conspecific with the larger southeastern *A. planirostris*. He assumed a zone of intergradation in the Llanos region of Venezuela. When specimens from the Field Museum of Natural History, the Royal Ontario Museum, and the Smithsonian Institution were reexamined, Lim and Wilson (1993) and Lim (1997) found no evidence of size intergradation. Phylogenetic analyses (33 continuous characters examining the mandible, teeth, and cranium and 22 discrete-state external, mandibular, dental, and cranial characters) suggest that *A. planirostris* is not conspecific with *A. jamaicensis* (Owen 1987).

During the writing of this account, A. planirostris was reclassified by Simmons (in press) as a subspecies of A. jamaicensis for the new edition of Mammal Species of the World. However, Lim et al. (2004) consider A. planirostris and A. jamaicensis to be distantly related taxa, based on parsimony analysis of the cytochrome-b mitochondrial gene. Van Den Bussche et al. (1998) grouped *A. planirostris* and *A. jamaicensis* into a single clade based on cytochrome-*b* data; however, the 2 specimens designated as *A. jamaicensis* represent the taxon *A. planirostris* (Lim et al. 2004).

Clarification of the holotype is given by Handley (1991). Specimen 65 (1903/9437) from the Zoologische Staatssammlung Munich (ZSM) was designated as the lectotype of *Phyllostoma planirostre* Spix (Andersen 1908). Later, another bat ([66]/1903/9438, ZSM) was designated as the lectotype of *P. planirostre* Spix, because specimen 65 (1903/9437) was thought to be a juvenile or subadult, and therefore was designated as the paralectotype of *P. planirostre* Spix (Kraft 1982). This designation of the lectotype was invalidated by Handley (1991) because of its earlier selection by Andersen (1908). In addition, specimen 66 (1903/9438) cannot be a paralectotype of *P. planirostre* Spix, because it represents *Artibeus fimbriatus* Gray, not *P. planirostre* Spix (Handley 1991).

The generic name, *Artibeus*, is derived from the Greek *arti*-, denoting facial lines, and *beus*, referring to the occurrence of facial lines (Alvarez-Castañeda and Alvarez 1996). The species name, *planirostris*, comes from the Latin meaning flat snout. Spanish names for this species are falso vampiro grande (Bárquez et al. 1991:60) and frutero grande gris (Bárquez et al. 1993:42).

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