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Eumops glaucinus.

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Eumops glaucinus (Wagner, 1843)

Wagner's Mastiff Bat

Dysopes glaucinus Wagner, 1843:368. Type locality "Cuyaba [Matto Grosso, Brazil–Miller, 1924:88]."
Molossus ferox Gundlach, 1861:149. Type locality "Cuba."
Nyctinomus orthotis H. Allen, 1889:561. Type locality "Jamaica," but later restricted to "Spanishtown, Jamaica" (Hall, 1981: 250).
Molossides floridanus G. M. Allen, 1932:257. Type locality "(probably) the earlier Pleistocene deposit, no. 2 Bed, at Melbourne, Brevard County, Florida."

CONTEXT AND CONTENT. Order Chiroptera, Suborder Microchiroptera, Family Molossidae. The genus *Eumops* contains eight species; *E. auripendulus, E. bonariensis, E. dabbenei, E. glaucinus, E. hansae, E. maurus, E. perotis,* and *E. underwoodi* (Eisenberg, 1989; Freeman, 1981; Koopman, 1993). Two subspecies of *E. glaucinus* are recognized (Eger, 1977; Koopman, 1971):

E. g. floridanus (G. M. Allen, 1932:257), see above.
E. g. glaucinus (Wagner, 1843:368), see above.

DIAGNOSIS. Members of the genus *Eumops* have large, rounded pinnae that arise from a single point or are joined medially on the forehead. Smooth upper lips distinguish *Eumops* from *Tadarida* (Eger, 1977). Absence of a gap between the two upper incisors, which project forward in contact with each other, is a distinguishing feature of *Eumops* (Anderson, 1972; Miller, 1907). The antitragus of *Eumops* is well developed, and the tragus is either small and pointed or broad and square. Species vary in size from *E. bonariensis* with a minimum length of forearm of 37 mm, to *E. perotis* with a maximum length of forearm of 83 mm. The skull is cylindrical in shape and the basisphenoid pits are well developed. The upper incisors are slender and have a curved shaft. The palate is slightly arched, as compared with the domed palate of *Promops* (Eger, 1977).

Eumops glaucinus (Fig. 1) is smaller (average total length of males and females of *E. g. glaucinus*, respectively, are 24.6 and 24.2 mm) than *E. perotis* (average total length of males and females of *E. p. perotis*, respectively, are 33.7 and 32.5 mm), larger than *E. maurus* (average total length of males and females, respectively, are 21.7 and 20.7 mm—Eger, 1977; Eisenberg, 1989), and is similar in size to *E. auripendulus* (average total length of males and females of *E. a. auripendulus*, respectively, are 25.1 and 24.7 mm). Compared with *E. auripendulus*, the pelage of *E. glaucinus* is paler (Eger, 1977), and the contrast between the dorsum and venter is more pronounced (Redford and Eisenberg, 1992). In addition, *E. glaucinus* has a square and broad tragus, larger and better-defined basisphenoid pits, and the skull (Fig. 2) is longer and proportionally wider (Eger, 1977).

GENERAL CHARACTERS. Wagner's mastiff bat is medium-sized for the genus (Eger, 1977). The pelage is short and glossy, and color varies from black or brownish gray to cinnamon brown. The hairs are bicolored and pallid at their bases (Belwood, 1992); the underparts of the body are duller and paler than the back (Goodwin, 1946). One *E. glaucinus* had a white band on the venter due to partial albinism (Gundlach, 1877).

The snout of *E. glaucinus* is elongate and there is no leaf-like projection on the nose. The upper lip does not protrude. There is a keel-like projection above the eye. The ears are wider than long (length, 17–23 mm) and joined over the forehead. When the ears are brought forward, they extend 1–2 mm beyond the end of the snout (Silva Taboada, 1979). The tragus is 4–5 mm in length (Hall, 1981), well developed, and square across the top (Sanborn, 1932).

The most obvious difference between sexes is the presence of a functional gular-thoracic gland in males (Silva Taboada, 1979). For *E. g. glaucinus*, males are significantly ($P \leq 0.05$) larger than females, but sexual dimorphism has not been examined in *E. g. floridanus* (Eger, 1977). In Cuba, the greatest differences in linear dimensions between the sexes of *E. g. glaucinus* (males are larger than females) are in width of canine (3.2%), width of lacrimal (2.4%), and postorbital width (2.0%). There also are significant ($P \leq 0.05$) differences in length of forearm (1.1%), length of humerus (1.4%), and occipitopremaxillary length (1.7%). Average (range in parentheses) measurements (in mm) of males and females, respectively, are: length of forearm, 61.2 (59.0–63.6), 60.5 (57.8–63.2); length of humerus, 34.6 (33.0–35.7), 34.1 (32.8–35.3); length of upper toothrow, 10.0 (9.8–10.3), 9.9 (9.6–10.0); width of canine, 6.3 (6.0–6.5), 6.1 (5.9–6.3); width of molar, 10.3 (9.8–10.5), 10.1 (9.9–10.3); width of lacrimal, 8.2 (7.8–8.4), 8.0 (7.6–8.2); width of zygomatic arch, 15.0 (14.4–15.4), 14.8 (14.3–15.2); width of mastoid, 13.4 (13.1–14.1), 13.4 (13.2–13.7); length of lower toothrow, 10.8 (10.6–11.1), 10.6 (10.4–10.8—Silva Taboada, 1979).

In Florida, mass usually is 30.2–46.6 g, but a pregnant female, far from full term, had a mass of 55.4 g; another pregnant female had a mass of 39 g in August (Belwood, 1992). In Cuba, average mass (September–January) of males is 36.6 g (range, 31.7–42.4)

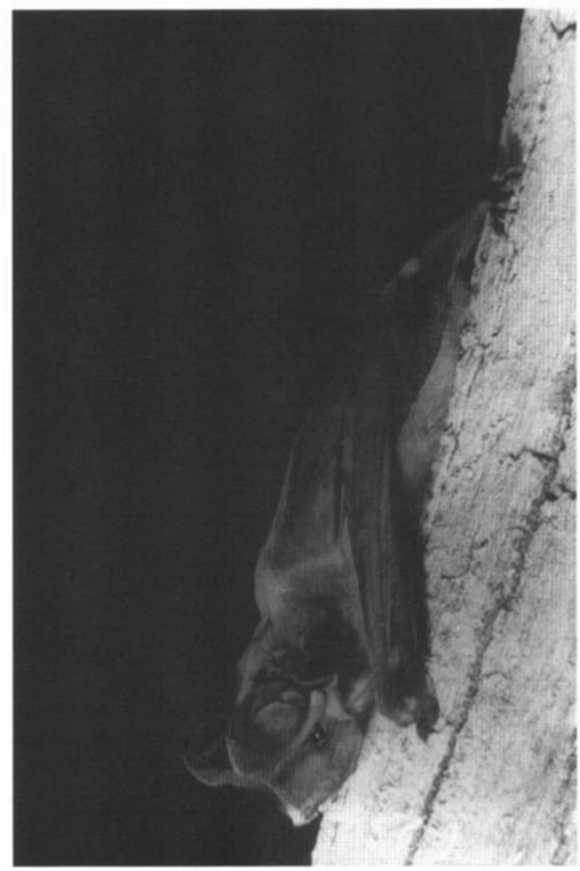

FIG. 1. An adult *Eumops glaucinus floridanus* near Miami, Florida. Photograph courtesy of J. S. Altenbach.

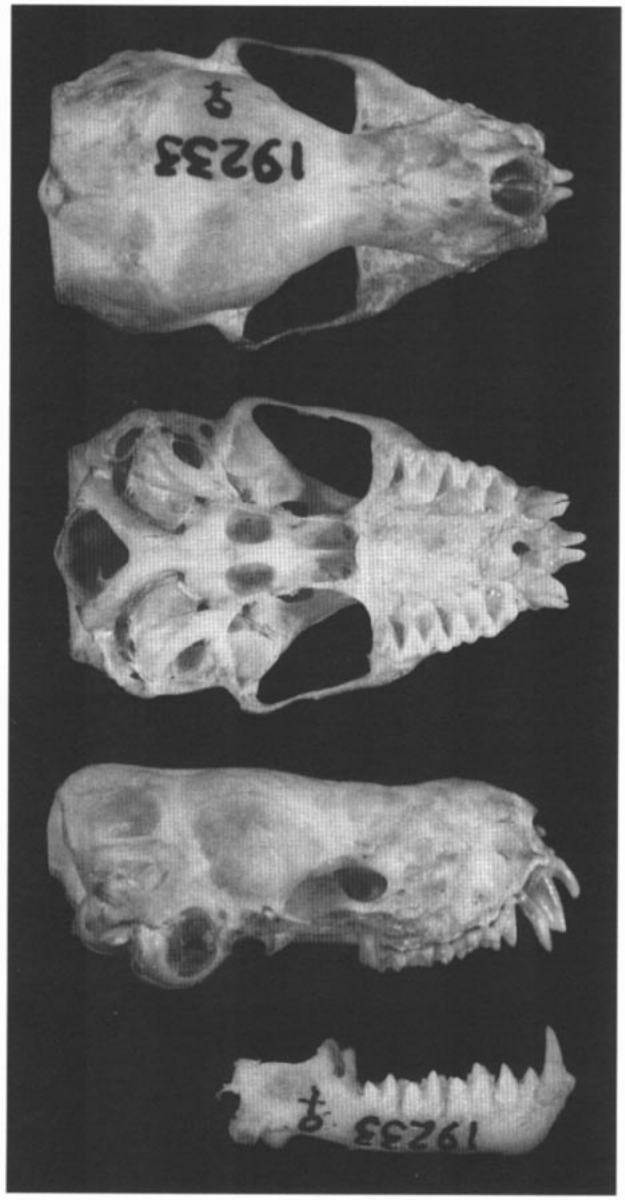

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Eumops g. glaucinus* from Jesus Carranza, Veracruz, Mexico (female, University of Kansas Museum of Natural History 19233). Greatest length of cranium is 24.1 mm. Photographs by T. L. Best and J. C. Rainey.

and of females is 37.3 g (range, 30.4–44.5—Silva Taboada, 1979). In Yucatán, Mexico, males are significantly ($P \leq 0.05$) larger than females in mass (average, 35.9 and 34.4 g, respectively—Bowles et al., 1990). In Venezuela, average mass is 33.8 g for males and 32.5 g for females (Eisenberg, 1989).

There is significant ($P \leq 0.05$) geographic variation among populations of *E. glaucinus*. Populations from northern Mexico are isolated from southern Mexican populations by the Sierra Madre del Sur. Because *E. g. glaucinus* occurs in the Greater Antilles, but not in the Lesser Antilles, the populations on Cuba and Jamaica may be derived from Central America rather than from South America. The Cuban population may have been derived from Mexican populations of *E. glaucinus*. There are no apparent north-south clines in geographic variation, but there are two subsets of populations; one group includes populations in Costa Rica, Honduras, and Peru, and the other includes populations from Colombia, Cuba, and Venezuela (Eger, 1977). In Cuba, there is no significant ($P > 0.05$) geographic variation (Silva Taboada, 1979).

Individuals from Florida are considerably larger than those from Central America and the skulls are noticeably different (Barbour and Davis, 1969). Average measurements (in mm) of males (n = 12–20) of *E. g. floridanus* and males (n = 65–82) and females (n = 116–153) of *E. g. glaucinus*, respectively, are: length of forearm, 64.3, 59.6, 59.2; length of cranium, 26.9, 24.6, 24.2; condyloincisive length, 25.5, 23.6, 23.1; zygomatic width, 16.4, 14.6, 14.4; mastoid width, 14.1, 13.1, 12.9; height of braincase, 9.1, 8.5, 8.5; length of maxillary toothrow, 10.6, 9.6, 9.5; postorbital constriction, 5.2, 4.9, 4.9 (Eger, 1977).

In Florida, ranges of external measurements (n = 3; in mm) of *E. g. floridanus* were: length of forearm, 58–69; length of hind foot, 11–15; length of ear, 20–31 (Belwood, 1992). In Venezuela, average measurements of males (n = 13) and females (n = 38–41), respectively, of *E. g. glaucinus* were: total length, 135.5, 134.9; length of head and body, 87.8, 86.4; length of tail, 47.7, 48.4; length of hind foot, 14.4, 14.5; length of ear, 28.8, 27.9; length of forearm, 58.4, 58.4 (Eisenberg, 1989). In Bolivia and Paraguay, average (range in parentheses) measurements of males (n = 3) and females (n = 2), respectively, of *E. g. glaucinus* were: total length, 149 (142–153), 144 (142–146); length of tail, 51 (49–53), 51 (50–52); length of hind foot, 14 (14–14), 14 (13–14); length of ear, 28 (28–29), 27 (26–28); length of forearm, 61.6 (60.8–62.7), 60.1 (59.8–60.4); length of third metacarpal, 62.7 (61.3–64.0), 62.5 (62.2–62.7); greatest length of skull, 23.8 (23.2–24.2), 23.2 (23.1–23.3); condylobasal length, 23.5 (22.8–24.0), 22.7 (22.5–22.9); zygomatic breadth, 15.3 (15.2–15.5), 14.8 (14.8–14.8); least interorbital constriction, 5.1 (5.0–5.2), 5.3 (5.2–5.4); greatest breadth across mastoid processes, 13.6 (13.4–13.8), 13.2 (13.0–13.3); breadth of palate and molars, 10.5 (10.3–10.6), 10.3 (10.2–10.4); breadth across the labial cingula of the canines, 6.3 (6.2–6.4), 6.0 (6.0–6.1); length of maxillary toothrow, 9.9 (9.6–10.1), 9.9 (9.9–9.9—Myers and Wetzel, 1983). In Yucatán, Mexico, average (range in parentheses) measurements (in mm) of males (n = 4) and females (n = 15), respectively, of *E. g. glaucinus* were: total length, 138 (134–144), 135 (130–140); length of forearm, 57.8 (56.9–59.2), 58.8 (56.6–61.5); greatest length of skull, 23.1 (22.7–23.5), 22.5 (22.1–22.8); length of maxillary toothrow, 9.2 (9.0–9.4), 9.1 (8.8–9.4); zygomatic breadth, 14.5 (14.2–14.9), 14.1 (13.8–14.6); interorbital breadth, 4.9 (4.8–5.0), 4.9 (4.7–5.1); mastoidal breadth, 13.1 (13.0–13.4), 12.8 (12.5–13.1); palatal breadth at molars, 9.7 (9.6–9.9), 9.7 (9.3–10.2—Birney et al., 1974). In Costa Rica, average (range in parentheses) measurements of males (n = 6–9) and females (n = 12–14), respectively, of *E. g. glaucinus* were: length of forearm, 59.3 (58.1–60.3), 58.9 (56.9–59.9); greatest length of cranium, 24.2 (23.9–24.6), 23.8 (23.1–24.4); condylobasal length, 22.3 (22.0–22.9), 22.0 (21.2–22.4); zygomatic breadth, 14.5 (14.1–14.8), 14.2 (13.7–14.5); mastoidal breadth, 13.0 (12.8–13.2), 12.8 (12.5–13.2); breadth of braincase, 11.5 (10.8–12.0), 10.9 (10.4–11.4); postorbital constriction, 5.0 (4.9–5.2), 4.9 (4.8–5.2); breadth across M3-M3, 9.9 (9.8–10.0), 9.7 (9.2–10.1); length of maxillary toothrow, 9.5 (9.3–9.8), 9.2 (9.0–9.4); length of mandibular toothrow, 10.3 (10.0–10.6), 10.0 (9.7–10.2—Gardner et al., 1970).

DISTRIBUTION. Wagner's mastiff bat occurs in southern Florida, Cuba, Jamaica, and from central Mexico to Peru, Bolivia, Paraguay, northern Argentina, and southeastern Brazil (Barquez et al., 1993; Eger, 1977; Eisenberg, 1989; Koopman, 1982; Redford and Eisenberg, 1992; Fig. 3). *E. glaucinus* has the most restricted range of any mammal in Florida. At one time, it was believed that this species was accidentally introduced by ship from Cuba, but fossil remains indicate that it occurred in the state in the Pleistocene (Layne, 1974). *E. glaucinus* has been found at elevations of 45–240 m in Panama (Tyson, 1964), 150–600 m in Venezuela (Eisenberg, 1989; Handley, 1976), and 2,750 m in Colombia (Tamsitt and Valdivieso, 1963). In Venezuela, 93% of the occurrences were at elevations <500 m (Handley, 1976).

FOSSIL RECORD. Pleistocene and Holocene remains of *E. glaucinus* have been recovered in Florida (Allen, 1932; Martin, 1977; Morgan, 1985; Ray, 1958; Ray et al., 1963). No other fossils are known.

FORM AND FUNCTION. The cranium (Fig. 2) is large, robust, longer than wide, and flattened dorsoventrally. The rostrum is shorter than the cranium and both are along the same plane. A sagittal crest is present, and there is a prominent occipitotemporal crest. The lacrimal crest projects slightly, the anterior palatal foramen is small, the pterygoid processes are parallel, and the foramen magnum opens posteriorly, slightly above the palatal plane.

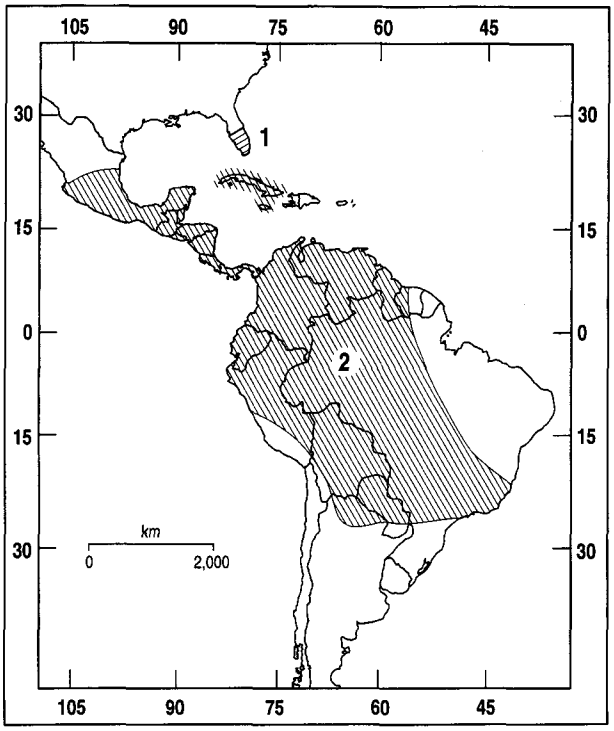

FIG. 3. Distribution of *Eumops glaucinus* in North and South America (Barquez et al., 1993; Eger, 1977; Koopman, 1982; Redford and Eisenberg, 1992): 1, *E. g. floridanus*; 2, *E. g. glaucinus*.

The tympanic bulb is small and elevated; the auditory bulla are visible. The basisphenoid fossa is well defined (Silva Taboada, 1979) and is oval to semi-oval in shape (Eger, 1977).

The dental formula is i 1/2, c 1/1, p 2/2, m 3/3, total 30 (Eisenberg, 1989; Mares et al., 1989). Upper incisors are long, pointed, and may contact the large canines (Silva Taboada, 1979). Lower incisors are small (Goodwin, 1946), bilobed, and form a curve anteriorly between the canines. The bases of the canines may contact the incisors. P1 is smaller than P2 and is pushed outward because of the proximity of P2 and the canine (Silva Taboada, 1979); P3 is moderate-sized (Freeman, 1981). The molars are successively smaller; M1 and M2 are similar in size and shape, and M3 is much smaller (Silva Taboada, 1979).

The dentary is thin (Freeman, 1981). The coronoid processes of the mandible are thin and pointed, and moderately elevated above the condyles. The angular process curves outward but is not hooklike; the end is rounded and projects beneath the lower part of the horizontal ramus. The anterior border of the ascending ramus slants posteriorly and is concave. The mental foramen is located beneath and between the premolars (Silva Taboada, 1979). Measurements (in mm) of the mandible of three specimens, respectively, were: total length of mandible, 17.5, 17.2, —; anterior tip of jaw to mandibular foramen, —, 16.0, 14.9; anterior tip of jaw to back of m3, 11.5, 11.6, 10.5; depth of mandible at front of m1, 3.4, 3.6, 3.5; depth of mandible behind m3, —, 3.5, 3.2; length of m1–m3, 7.3, 7.5, 6.7; length of m1, 2.5, 2.7, 2.5; length of m2, 2.5, 2.6, 2.4; length of m3, 2.3, 2.3, 2.1; height of m1 from labial base of the crown to tip of protoconid, 2.6, 2.6, 2.6 (Ray et al., 1963).

The pelage is short (5–7 mm) dorsally and ventrally, and continues ca. 12 mm on both sides of the plagiopatagium along the length of the body. Dorsally, there are fine hairs on the wing membranes (on the propatagium, along the forearm, and on each side of the proximal end of the fifth metacarpal). Ventrally, there are also fine hairs around the elbow (Silva Taboada, 1979).

The plagiopatagium extends to the heel. The third metacarpal is 2–3 mm longer than the fourth, the fifth metacarpal is about one-half the length of the third, and the fourth metacarpal is about as long as the forearm (Silva Taboada, 1979). The tibia is 20.5–22.0 mm in length (Sanborn, 1932) and is shorter than the first phalange of the third finger. The tail is 48–61 mm in length and ≤40 mm extends beyond the margin of the uropatagium. The uropatagium is moderately wide. The calcar is thin and long (17–24 mm) and occupies >50% of the free border of the uropatagium (Silva Taboada, 1979).

Wings of members of the genus *Eumops* are among the narrowest of all molossids (Freeman, 1981) and are well-adapted for rapid, prolonged flight (Vaughan, 1959). This wing structure is conducive to high-speed flight in open areas; high-speed flight apparently is correlated with high aspect-ratios (Findley et al., 1972).

Wingspan ranges from 409 (Silva Taboada, 1979) to 470 mm (Barbour and Davis, 1969). In Mexico, average measurements of wings of males and females, respectively, are: length of forearm (in mm), 59.4, 58.9; aspect ratio (wingspan^2/surface area of wings), 10.00, 9.23; wing loading (mass/surface area of wings plus uropatagium), 0.21, 0.20 (Bowles et al., 1990). In Cuba, total surface area of the wings is 209.2 cm^2 (range, 201.6–216.0) and 207.3 cm^2 (range, 191.6–215.4) for males and females, respectively. The wing loading (mass/total surface area of the wing) is 0.17 (range, 0.15–0.19) and 0.16 (range, 0.14–0.17) for males and females, respectively (Silva Taboada, 1979).

Wagner's mastiff bat has a pungent musky odor. In males, there is a scent gland in the gular-thoracic region, the exact function of which is unknown. It may be used to mark females or roosting sites (Belwood, 1992). In Yucatán, Mexico, in June, all males had enlarged or secreting gular-thoracic glands (Bowles et al., 1990).

The glans penis of *E. glaucinus* is not significantly ($P > 0.05$) different from that of *E. auripendulus* or *E. perotis*. At its base, the glans is oval in cross-section, but at mid-length the glans widens and is dorsoventrally compressed. From its widest point (ca. 66% of the distance from the prepucial junction) the glans tapers sharply and terminates bluntly. Along the ventral surface of the glans there is a prominent medial ridge that encloses the urethra. This urethral ridge terminates by forming a collar around the ventral rim of the urinary meatus (Ryan, 1991).

In dorsal view, the baculum of *E. glaucinus* is rounded basally, slightly expanded medially, and bluntly pointed distally. The bone is broad and bowed downward in lateral aspect and the base is round and enlarged. There is a sharp tip at the upper surface of the distal end. Measurements (in mm) of one baculum from Venezuela were: greatest length, 0.52; greatest breadth at base, 0.08; in lateral aspect, greatest distance from ventral surface to a line connecting the lowermost basal and distal projections, 0.04 (Brown, 1967).

ONTOGENY AND REPRODUCTION. Wagner's mastiff bat is polyestrous and usually gives birth to only one young (Belwood, 1992; Birney et al., 1974). In Florida, young are present in June, and pregnant females are known from August and September (Belwood, 1992; Jennings, 1958; Robson et al., 1989). On 7 September, one colony contained one adult male and seven adult females. The adult male, whose testes were 7–9 mm in length, had a mass of 46.6 g and had little fat. Five of the seven females were postlactating, showed considerable loss of hair, and had an average mass of 46.2 g. A sixth was pregnant with a single fetus, which had a crown-rump length of 23 mm. Her mass was 55.4 g, she had considerable subcutaneous fat, and she showed no loss of hair (Belwood, 1981). The presence of advanced gestation on 30 August indicates a late summer-autumn birthing season (Robson et al., 1989). On 2 September, measurements of one fetus were: crown-rump length, 38 mm; total length, 68 mm; length of tail, 22 mm; length of forearm, 21 mm; length of hind foot, 9 mm; length of ear, 7 mm; mass, 3.9 g (Robson et al., 1989).

In Cuba, there is evidence of reproductive activity (gestation, lactation, presence of juveniles and subadults) throughout most of the year. The oldest of two embryos (October) examined was 21.3 mm in length of forearm, 33 mm in total length, and mass was 7.9 g (21.6% of the mass of the mother). Except for vibrissae and bristles on the snout and feet, the embryo lacked hair. Only the first upper incisor and the lower canine protruded through the gums. Probably, the dental formula for deciduous teeth is i 2/2, c 1/1, p 0/1, total 14 (Silva Taboada, 1979).

In Mexico, testes of adult males are 7–8 mm in length from April through June (Birney et al., 1974; Bowles et al., 1990). In Hidalgo, Mexico, two pregnant females were observed on 25 March (Polaco et al., 1992). In Yucatán, Mexico, pregnant females are present from late April to late June and lactating females from mid-

June to late July. Parturition is synchronous in the latter one-half of June, with lactation lasting at least 5–6 weeks. Crown-rump length of embryos vary considerably on a given date: 19 April, 15 and 16 mm; 8 May, 6, 16, 18, 19, 23, and 30 mm; 17 May, twins—3 (left) and 6 (right), 20, 20, 25, 27, 28, and 30 mm; 20 June, 28, 29, and 31 mm (Birney et al., 1974; Bowles et al., 1990).

In Costa Rica, a female contained a small embryo (ca. 3 mm) on 30 December, and another contained a 16-mm embryo on 19 May. Two females were lactating on 13 April, five were lactating on 1 May, and one was lactating on 3 August (Gardner et al., 1970). In Honduras, a female was lactating on 5 August (La Val, 1969). In Argentina, a very young *E. glaucinus* was present in mid-September (Barquez et al., 1991).

ECOLOGY. Wagner's mastiff bat is a typical inhabitant of subtropical forests (Massoia, 1976). In Florida, *E. glaucinus* often occurs in residential Miami, Coconut Grove, and Coral Gables. Most have been observed in buildings, low shrubbery, and where there are lush growths of tropical flowers and shrubs (Jennings, 1958). Sightings in Miami indicate that its favorite diurnal roosts may be the shingles under Spanish-tile roofs, although some have been found in shafts of the leaves of the royal palm (*Roystonea regia*) in Coral Gables (Belwood, 1992). In downtown Coral Gables, an adult female was present at 0800 h on the seventh-floor balcony of an office building. When it was removed from the balcony ca. 1600 h, the bat was lethargic. It had been lying in a corner of the balcony partially exposed to the afternoon sun. There were no signs of trauma and the bat made no effort to escape or struggle when it was picked up (Robson et al., 1989).

In a pine flatwoods community of southern Florida, a small colony was present in a longleaf pine (*Pinus palustris*). The bats were roosting in a cavity, which was 4.6 m above ground level, had been excavated by a red-cockaded woodpecker (*Picoides borealis*), and subsequently enlarged by a pileated woodpecker (*Dryocopus pileatus*). The roost site was not being used by woodpeckers. The tree, which was 9 m tall, was removed as part of a highway construction project. The colony consisted of seven females and one male, all adults (Belwood, 1981).

In Cuba, most records of *E. glaucinus* are from large cities. Wagner's mastiff bat inhabits buildings, occurs under roof tiles (Gundlach, 1877; Miller, 1904; Silva Taboada, 1979), and lives in trees (Silva Taboada, 1979). In one study, this species was found in nine tree roosts: in two of these roosts, there was no mention of the type of tree; in four, they lived in abandoned nests of woodpeckers in the trunks of royal palms; in one, they were in a cavity in the trunk of a dagame tree (*Callycophyllum candidissimum*); in another, they were in a cavity in the trunk of a mastic tree (*Bursera simaruba*); in another, they were in the foliage of a jata palm (*Copernicia vespertilionum*—Silva Taboada, 1979).

Colonies are small in Cuba; three had 9 (two subadults), 10, and 32 (nine subadults) individuals, respectively. The sexes were not segregated during the year, and juveniles, adult males, and adult females (nonreproductive, lactating, pregnant) occurred together. Sex ratio varies among age groups. The percentage of females observed in Cuba was: embryos, 50.0% (n = 2); subadults, 35.3% (n = 17); adults, 66.1% (n = 112—Silva Taboada, 1979).

In western Mexico, *E. glaucinus* occurs in tropical habitat (Gardner, 1962; Iñiguez Davalos, 1993). In eastern Mexico, it may be rare (Jones et al., 1973), but this was the second most abundant species in Campestre, Yucatán, Mexico (102 males, 160 females). At the Campestre Country Club, several were observed at a small, shallow, man-made pond (Bowles et al., 1990). Aside from a colony of ca. 15 males and females of *E. glaucinus* in a machine shed in Kinchil, Yucatán, Mexico (19 April—Birney et al., 1974), only one has been observed elsewhere in that region of Mexico (Colegio—Bowles et al., 1990).

In Costa Rica, Wagner's mastiff bat occurred in habitat characterized as subtropical moist forest. Here there was extensive agriculture, but there was a mixture of natural and second-growth forest remaining on hilltops and ridges and in the gorge of the nearby Río Corrogres (Gardner et al., 1970). This species was observed under the corrugated-iron roofing of buildings and apparently seeks the intense heat concentrated by the metal covering (Goodwin, 1946). In Panama, a colony of ca. 10 was present in the attic of a large house; the bats were living adjacent to the tin roof (Tyson, 1964).

In Venezuela, *E. glaucinus* usually occurs in tropical moist forest, but also may occur in subtropical moist or dry forests. It roosts in trees and houses, occurs over or near streams, swamps, lagoons, and dry areas, inhabits swamp forests, evergreen forests, and yards of dwellings (Handley, 1976). In forested areas, Wagner's mastiff bat primarily occurs in tree cavities (Belwood, 1992). In Colombia, one was observed in a lecture hall at The University of the Andes in Bogotá (Tamsitt and Valdivieso, 1963). In Argentina, *E. glaucinus* occurs in deserts, scrublands, and montane forests (Mares et al., 1989), and roosts in cracks of buildings, in hollow trees, and in human dwellings (Barquez et al., 1991, 1993).

Wagner's mastiff bat consumes flying insects (Goodwin, 1946; Iñiguez Davalos, 1993; Mares et al., 1989). In Florida, feces collected from a hollow tree roost primarily contained remains of Coleoptera (55%), Diptera (15%), and Hemiptera (10%—Belwood, 1981). In Cuba, one stomach contained remains of beetles (*Termonetus*, Dytiscidae), moths, and orthopterans. A small sample of feces was collected at the roost and it contained only fragments of orthopterans (Silva Taboada, 1979). In captivity, an adult female was kept for a month on a diet of raw ground beef, vitamins, and water (Barbour and Davis, 1969).

In Cuba, an American kestrel (*Falco sparverius*) was observed on the branch of a mastic tree holding a screaming *E. glaucinus*. The bird had difficulty holding the bat, which soon escaped. Remains of Wagner's mastiff bat have been recovered from pellets of the barn owl (*Tyto alba*—Silva Taboada, 1979).

In Cuba, *E. glaucinus* has shared its day roost near (but not in contact with) the following species of bats: *Molossus molossus*—five instances in buildings, two in royal palms, and one in a mastic tree; *Tadarida laticaudata* and *Mormopterus minutus*—the three taxa were in a jata palm; *Artibeus jamaicensis*—one instance in a royal palm (Silva Taboada, 1979). In Veracruz, Mexico, three *E. glaucinus* were in the same attic of a wooden building where a colony of ca. 25 *Glossophaga soricina* was roosting on 12 March, and Wagner's mastiff bat also occurred in the same building as *Molossus ater* (Hall and Dalquest, 1963).

Parasites include *Trichobius cognatus* (Peterson and Hůrka, 1974), *Antricola marginata* (Pérez Vigueras, 1934; Silva Taboada, 1965, 1979), and *Hesperoctenes angustatus* (Handley, 1966). No endoparasites are known.

In Florida, Wagner's mastiff bat is vulnerable to habitat loss (in urban and forested areas), habitat alteration (removal of older trees with roosting cavities in favor of younger stands of trees for commercial use in forested areas), and heavy spraying of pesticides for control of mosquitoes in urban areas. Pesticides are believed to have played a role in the demise of populations of this species in Miami (Belwood, 1992).

Eumops glaucinus has been captured in mist nets (Gardner, 1962; La Val, 1969; Tyson, 1964). In Hidalgo, Mexico, two were captured in a mist net set over a branch of the Río Pánuco, which was ca. 30 m wide, on 25 March (Polaco et al., 1992).

BEHAVIOR. Wagner's mastiff bat is nocturnal (Silva Taboada, 1979) and roosts in colonies (Goodwin, 1946); sex ratios suggest that a colony consists of a male and his harem (Belwood, 1981). Such social groupings may be facilitated by roosting in tree cavities, which can be defended from other males (Belwood, 1992). These bats are quiet and calm in the day roost. When disturbed, they do not attempt to fly away, but they emit loud, high-pitched vocalizations. If held in the hand, they scream incessantly (Silva Taboada, 1979).

In Cuba, *E. glaucinus* was observed leaving the roost 4–33 min after sunset on six occasions, beginning at 1756 h in October and at 1908 h in April. On three of these occasions, activity ended 14–28 min before sunrise, which was 0545 h in October and 0605 h in November. During the night of 18–19 October, the nocturnal activity of a colony with 32 individuals, which inhabited a cavity in the trunk of a royal palm, was observed continually. The ambient temperature was 23.8–25.4°C. Each bat had two foraging periods during the night; all had left the roost within 20 min of sunset, but they were slow to return. Within 3 h of leaving the roost, only 25% of the bats had returned. On another occasion, a rainstorm began 22 min after the bats left the roost, which caused all the bats to return to the roost immediately (Silva Taboada, 1979).

Eumops glaucinus can take flight from horizontal surfaces (Belwood, 1992). This species flies at great heights (Barbour and Davis, 1969; Belwood, 1992); rarely at altitudes <10 m (Belwood, 1992). Wagner's mastiff bats usually fly in a straight line (Silva

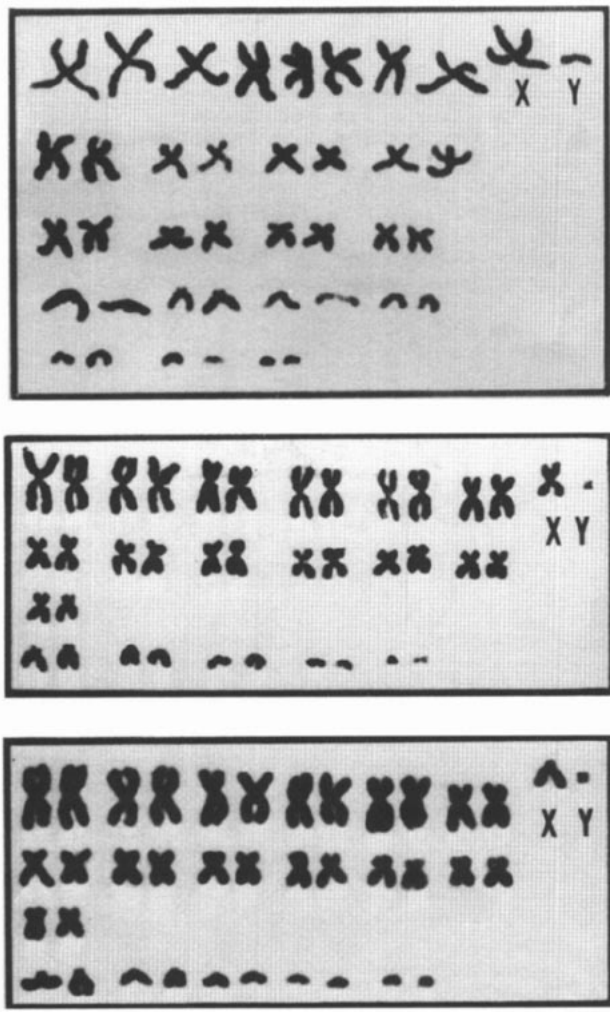

FIG. 4. Karyotypes of a male *Eumops g. glaucinus* (top) from Puerto Lopez, Colombia (2n = 40, FN = 64), a male *E. g. glaucinus* (middle) from near Cintalapa, Chiapas, Mexico (2n = 38, FN = 64), and a male *E. g. glaucinus* (bottom) from Santa Ana, Costa Rica (2n = 38, FN = 64—Warner et al., 1974).

Taboada, 1979). They are "fast-hawking" bats that rely on speed and agility to catch insects in the absence of clutter. This taxon is confined to foraging in open spaces and uses echolocation to detect prey at relatively long range (3–5 m—Belwood, 1992). *E. glaucinus* flies faster than smaller bats, but it cannot maneuver as well in small spaces (Barbour and Davis, 1969).

When within <3 m of a *E. glaucinus* in flight, a human cannot hear any noise from the wing beats (Barbour and Davis, 1969). However, Wagner's mastiff bat makes a loud and distinctive call at night as it flies and forages over head (Belwood, 1992). Once a person recognizes its loud, piercing call, the sound of this species easily can be distinguished from other nighttime sounds. *E. glaucinus* has been heard, as it was flying overhead, from an automobile in heavy traffic in downtown Miami, Florida (Barbour and Davis, 1969).

Wagner's mastiff bat may become inactive at cooler ambient temperatures, but there is no evidence that it hibernates. In Veracruz, three *E. glaucinus* in the attic of a wooden building were rather torpid on a warm day in mid-March. When pulled from between two boards, which overlapped loosely and formed a crevice ca. 2 cm wide, they did not attempt to escape, struggle, or vocalize (Hall and Dalquest, 1963).

GENETICS. Three karyotypes are known for *E. glaucinus* (Fig. 4). One karyotype has 2n = 40 (Fig. 4, top) with the autosomes consisting of 1 large pair of submetacentrics, a gradated series of 11 pair of smaller submetacentrics, 1 pair of small subtelocentrics, and 6 pair of medium to small acrocentrics. The sex chromosomes consist of a metacentric X almost as large as the largest pair of autosomes and an acrocentric Y. The other two karyotypes of *E. glaucinus* have 2n = 38, the lowest diploid number in any member of the genus *Eumops*. One of the 2n = 38 karyotypes is composed of a gradated series of 14 pair of submetacentric (one pair of which is the X), 1 pair of small subtelocentrics, and 4 pair of small acrocentrics. Variation in the morphology of one of the medium-sized submetacentric elements (possibly the X chromosome) was found in specimens from Honduras and Costa Rica. Chromosomes like those shown as the X in Fig. 4 (middle) were present in three of four specimens from Veracruz and Chiapas, Mexico. A male from Costa Rica possessed no acrocentric chromosomes (Fig. 4, bottom), whereas one female from Honduras had one acrocentric and a submetacentric element. This heterozygous female suggests interbreeding between these two chromosomal forms. The Y chromosome in both karyotypes appears to be a small metacentric (Warner et al., 1974). Allozymic data and analyses based upon sequence analyses of mitochondrial DNA indicate a close relationship between *E. glaucinus* and *E. perotis* (Sudman et al., 1994).

REMARKS. *Eumops* is from the Greek prefix *eu-* meaning "good" or "true" and the Malayan *mops* meaning bat. The specific epithet *glaucinus* probably is from the Greek *glaukos* meaning silvery or gleaming (Jaeger, 1955). Additional common names include chestnut mastiff bat (Goodwin, 1942), murciélago mastín (Villa R., 1967), moloso blanquecino (Mares et al., 1989), moloso orejon blanquecino (Barquez et al., 1991), and moloso acanelado (Barquez et al., 1993).

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