MAMMALIAN SPECIES No. 132, pp. 1–3, 4 figs.

Lasiurus intermedius.

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Published 15 April 1980 by The American Society of Mammalogists

Lasiurus intermedius H. Allen, 1862
Northern Yellow Bat

Lasiurus intermedius H. Allen, 1862:246. Type locality Matamoros, Tamaulipas.
Dasypterus floridanus Miller, 1902:392. Type locality Lake Kissimmee, Oceola Co., Florida.

CONTEXT AND CONTENT. Order Chiroptera, Family Vespertilionidae, Subfamily Vespertilioninae, Tribe Lasiurini. The genus *Lasiurus* contains 11 extant species. Three subspecies of *L. intermedius* currently are recognized (Hall and Jones, 1961):

L. i. intermedius H. Allen, 1862:246, see above.
L. i. floridanus (Miller, 1902:392), see above.
L. i. insularis Hall and Jones, 1961:85. Type locality Cienfuegos, Las Villas, Cuba.

DIAGNOSIS. Yellow bats (*Lasiurus intermedius, L. ega,* and their relatives) differ from other species of *Lasiurus* as follows (Handley, 1959, 1960; Lowery, 1974): pelage yellowish rather than reddish or grayish; one upper premolar rather than two; only anterior half of dorsal surface of uropatagium furred rather than entire dorsal surface; sagittal crest pronounced rather than poorly developed; ears decidedly more pointed; white patches lacking on shoulders and wrists; rostrum relatively long; coronoid process high; and lateral wings of presternum wider than body of presternum (rather than same width as body).

Lasiurus intermedius (Fig. 1) differs from the smaller and sympatric *L. ega* primarily in size. According to Hall and Jones (1961), key characteristics that distinguish the former from the latter are: total length more than 119; condylocanine length more than 16.5; length of maxillary toothrow more than 6.0.

GENERAL CHARACTERISTICS. The three subspecies of *Lasiurus intermedius* differ in size, *floridanus* being the smallest and *insularis* the largest. Selected average external (n = 14) and cranial (n = 10) measurements in mm (extremes in parentheses) for a series of male *L. i. floridanus* from Aucilla River, Jefferson Co., Florida (Hall and Jones, 1961) are: total length, 126.8 (121 to 131.5); length of tail vertebrae, 54.2 (51 to 60); length of hind foot, 9.8 (8 to 11); length of ear from notch, 16.3 (15 to 17); length of forearm (dry), 48.1 (46.7 to 50.0); condylocanine length, 17.6 (17.0 to 18.2); zygomatic breadth, 12.8 (12.6 to 13.0); least interorbital breadth, 5.0 (4.7 to 5.3); C-M3 alveolar length, 6.2 (6.0 to 6.4); breadth of rostrum at infraorbital canals, 7.2 (6.9 to 7.5); mastoid breadth, 10.0 (9.6 to 10.2); length of mandibular toothrow, 8.0 (7.8 to 8.2). The same measurements for three males of *L. i. intermedius* from Sierra de Tamaulipas, Tamaulipas (Hall and Jones, 1961) are: 146, 136, 142; 69, 67, 70; 11, 11, 11; 17, 16, 17; 53.2, 51.8, 51.9; 18.2, 18.4, 18.3; 13.2, 13.7, 13.2; 5.5, 5.2, 5.1; 6.2, 6.5, 6.5; 7.6, 7.4, 7.6; 10.3, 10.6, 10.3; 8.0, 8.4, 8.1. The same measurements for three females of *L. i. insularis* (all preserved in alcohol) from Cuba (Hall and Jones, 1961) are: 164, 161, 150; 68, 76, 77; 12, 12, 13; 20, 17, 19; 61.2, 62.6, 61.8; 20.5, 21.5, 20.9; 15.2, 15.6, 14.8; 4.6, 4.7, 4.6; 7.2, 7.5, 7.3; 8.2, 8.9, 8.4; 11.9, 11.8, 11.2; 9.6, 9.7, 9.7.

Females average larger than males in all three races of the northern yellow bat. The following cranial measurements of two females and two males, respectively, from Baton Rouge, Louisiana (Hall and Jones, 1961) are illustrative: condylocanine length, 18.7, 18.5, 18.0, 18.0; C-M3 alveolar length, 6.7, 6.7, 6.4, 6.5; mastoid breadth, —, 10.1, 9.9, 9.9; length of mandibular toothrow, 8.8, 8.7, 8.0, 8.2.

Excellent descriptions of dental and cranial features and illustrations are in Allen (1894), Miller (1907), and Barbour and Davis (1969). The dental formula is i 1/3, c 1/1, p 1/2, m 3/3, total 30. The third, fourth, and fifth digits are successively shortened. The skull and lower jaw are illustrated in Fig. 2.

Lasiurus intermedius is characterized externally by yellowish orange to yellowish brown pelage, faintly washed with black to yellowish-gray. The membranes are brownish and the calcar is slightly keeled. There are four mammae (Lyon, 1903).

DISTRIBUTION. The distribution of the northern yellow bat is mapped in Fig. 3. It is known from the coastal southeastern United States from Willoughby Beach, Virginia, southward to Florida, as well as from Cuba and Isla de Piños (Silva-Taboada, 1976, 1979). Koopman (1965) reported a single specimen from Westfield, New Jersey, but presumed it to be an accidental occurrence. Westwardly, *L. intermedius* is known along the Gulf Coast to south-central Texas, thence southward in eastern México through the Yucatán Peninsula and Guatamala to Honduras, and in western México from Oaxaca northward to southern Sinaloa.

FOSSIL RECORD. De Beaufort (1934) secured a cranium of *L. intermedius* from subfossil owl pellets found in a cave at San Blas, Cuba, and Silva-Taboada (1976) reported two subfossil skulls and a fossil mandible from Cuban caves. Martin and Webb (1974) referred a mandible from the Devil's Den Fauna, late Pleistocene of Florida, to *L. intermedius.*

FORM AND FUNCTION. The hair is silky and longer than that of red and hoary bats (Allen, 1894), measuring 12 mm at the middle of the back (Miller, 1897). There is no sexual dimorphism in pelage coloration although there is some individual and geographic variation (Handley, 1960).

Little fur is present on the inner surface of the ear, but the medial half of the external ear is furred (Allen, 1862); the tragus, similar to that of other lasiurines, is triangular (Hamilton, 1943). The baculum was figured by Hamilton (1949) and is similar to

FIGURE 1. Adult northern yellow bat (courtesy Roger W. Barbour).

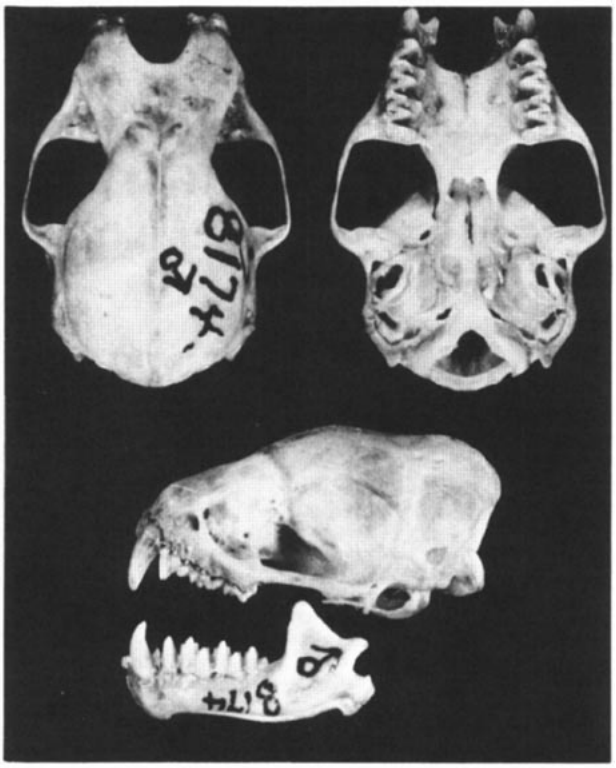

FIGURE 2. Dorsal, ventral, and lateral views of skull, and lateral view of lower jaw (♂, TTU 8174) of *Lasiurus intermedius* from Tamaulipas. Greatest length of skull is 19.5 mm.

that of other species of *Lasiurus*. It is greatly expanded dorsoventrally at the base, but constant in width throughout.

Facial glands include the sudoriparous glands of the lips, sebaceous glands, and submaxillary salivary and sublingual salivary glands (Werner and Dalquest, 1952).

The northern yellow bat may become torpid when exposed to cool temperatures at the northernmost part of its range (Rageot, 1955). No other physiological data are known. It is of note,

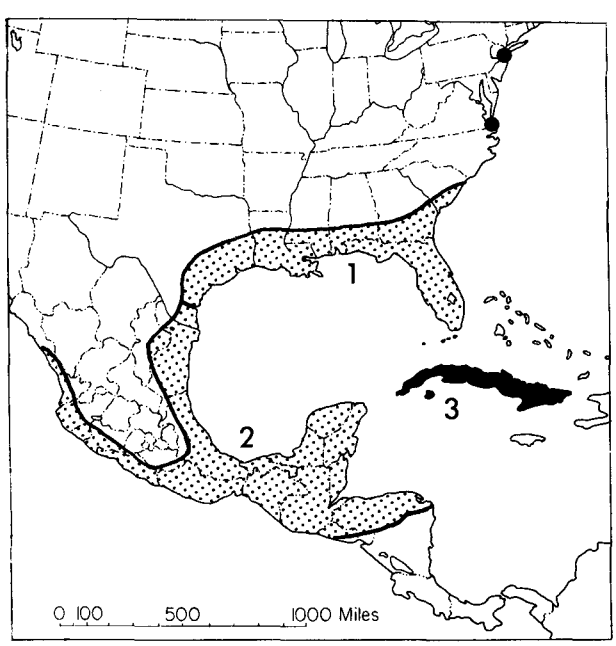

FIGURE 3. Geographic distribution of *Lasiurus intermedius*: 1) *L. i. floridanus*; 2) *L. i. intermedius*; 3) *L. i. insularis*. The two solid circles represent northerly localities of record for *L. i. floridanus* (see text).

FIGURE 4. Karyotype of female *Lasiurus intermedius* (TTU 7514) from 5 mi. SE Brownsville, Cameron Co., Texas.

however, that *L. intermedius* may transmit rabies (Wiseman et al., 1962).

ONTOGENY AND REPRODUCTION. Sherman (1944) studied the male reproductive cycle and found that spermatozoa are produced from September until mid-February. LaVal (1967) found males with enlarged testes (4 by 7 mm) in mid-August and early October, whereas a June-taken male had reduced testes (2 by 5 mm).

Pregnant females have been collected in May (Bailey, 1905; Rageot, 1955; Lowery, 1974; Silva-Taboada, 1979) and June (Loomis and Jones, 1964; LaVal, 1967; Martin, 1970). Lactating females are known from June (Lowery, 1936; LaVal, 1967; Carter and Jones, 1978) and July (Baker and Dickerman, 1956). A female with a perforate vulva was captured in March (Moore, 1949*a*). Breeding evidently takes place in autumn and winter (Hall and Jones, 1961; Barbour and Davis, 1969) and parturition occurs in May and June (Davis, 1960; Lowery, 1974). Litter sizes vary from two to four, averaging 3.4 in Florida populations (Barbour and Davis, 1969).

Volant juveniles have been collected in June (Bailey, 1905) and July (Bailey, 1905; Baker and Dickerman, 1956); in Louisiana Lowery (1974) observed that "All young are probably on the wing by the end of June or the first week of July." According to Barbour and Davis (1969), "Newborn young have a forearm length of about 16 mm and weigh about 3 g."

ECOLOGY. *Lasiurus intermedius* typically inhabits wooded areas in the vicinity of permanent water. In the southeastern United States, it occurs in both coniferous and deciduous forests, where it is thought to roost during the day in clumps of Spanish moss (*Tillandsia usenoides*) hanging from oaks. In other parts of its range, *L. intermedius* has been reported as inhabiting palm groves (Davis, 1960; Martin, 1970) and pine-oak woodlands (Jones, 1964; Carter et al., 1966; Carter and Jones, 1978). Baker and Dickerman (1956) found these bats roosting "among dried corn stalks hanging from the sides of a large, open tobacco shed" in Veracruz.

A stomach of this high-flying bat collected in August (Sherman, 1939) contained fragments of Homoptera, Zygotera (Odonata), Anthomyiidae (Diptera), Dytiscidae and Scolytidae (Coleoptera), and Myrmicinae (Hymenoptera). Ivey (1959) found individuals hunting flies and mosquitos in berms and "back-dune depressions" along Florida beaches and dunes.

Lowery (1974) reported *L. intermedius* to be a solitary rooster. However, "approximately 45 yellow bats were flushed" from a daytime roost in Veracruz (Baker and Dickerman, 1956). Evidently, there is sexual segregation in winter, with maternity colonies forming in the spring and summer (Barbour and Davis, 1969; Humphrey, 1975).

Many specimens in museum collections were taken over water in mist nets (Gardner, 1962; Jones, 1964; Carter et al., 1966; Carter and Jones, 1978) or shot at dusk as they foraged (Coleman, 1940; Sherman, 1944; Moore, 1949*a*; Baker and Dickerman, 1956; Loomis and Jones, 1964). Other individuals have been captured from trees by hand (Moore, 1949*b*; Rageot, 1955). Although this species does not normally inhabit buildings, one specimen was obtained in a garage (Koopman, 1965).

Radovsky (1967) reported *Steatonyssus radovskyi* (Acarina: Macronyssidae) from two northern yellow bats from Texas. No

other parasites are known from this species. Silva-Taboada (1979) reported skulls of *L. intermedius* from barn owl pellets in Cuba.

GENETICS. *Lasiurus intermedius* has a distinctive karyotype (2n = 26, FN = 42) among lasiurine bats. It consists of seven large pairs of metacentric and submetacentric chromosomes, one pair of medium metacentrics, two pairs of medium acrocentrics and two pairs of small acrocentrics (Fig. 4). The X-chromosome is a large acrocentric (Baker and Mascarello, 1969) and the Y-chromosome is a small acrocentric (Baker and Patton, 1967). All other lasiurines have a karyotype of 2n = 28, FN = 46. The northern yellow bat differs most parsimoniously from the other species by two pericentric inversions and in lacking one small acrocentric pair of autosomes (Baker and Patton, 1967).

REMARKS. Prior to the revision of yellow bats (*Dasypterus*) by Hall and Jones (1961), *L. intermedius* and *floridanus* were recognized as distinct species. *Lasiurus intermedius* was known from Texas southward to Honduras, and *L. floridanus* occurred from Virginia westward to Texas. However, animals intermediate between them in size and color occurred in Louisiana and southeastern Texas (Miller, 1897, 1902; Lowery, 1936, 1943, 1974; Hall and Kelson, 1959; Handley, 1959, 1960). Consequently, Hall and Jones (1961) considered the two to be conspecific.

Additionally, Hall and Jones (1961) named a third, larger subspecies, *Lasiurus intermedius insularis*, from Cuba. Silva-Taboada (1976, 1979), however, believed the Cuban bat to be specifically distinct from mainland populations on the basis of dental and cranial differences. We tentatively follow Hall and Jones (1961) in recognizing *insularis* as a subspecies of *intermedius*.

Proper generic placement of the yellow bats has been debated; however, morphological (Allen, 1862, 1894; Miller, 1897; Hamilton, 1949; Dalquest, 1953; Hall and Kelson, 1959; Handley, 1959, 1960) and karyotypic (Baker and Patton, 1967) data indicate that red, hoary, and yellow bats should be considered congeneric.

In the past, *Lariurus intermedius* has been termed the northern yellow bat, Florida yellow bat, eastern yellow bat, greater yellow bat, and big yellow bat. We propose, in an effort to create stability in use of mammalian vernacular names, that *L. intermedius* be referred to as the northern yellow bat.

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Principal editor for this account was D. F. WILLIAMS.

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