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Vampyrum spectrum.

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Vampyrum Rafinesque, 1815

Vampyrum Rafinesque, 1815:54. Type species *Vespertilio spectrum* Linnaeus 1758:31.

Vampyrus Leach, 1821:79. Renaming of Geoffroy St.-Hilaire's (1803) Vampire. (See Andersen, 1908, for additional explanation.)

CONTEXT AND CONTENT. Order Chiroptera, suborder Microchiroptera, Family Phyllostomidae, subfamily Phyllostominae. The genus *Vampyrum* is monotypic.

Vampyrum spectrum (Linnaeus, 1758)

Linnaeus' False Vampire Bat

Vespertilio spectrum Linnaeus, 1758:31. Type locality "America australi"; restricted to Surinam by Thomas (1911:130).

Vampyrum spectrum, Andersen, 1908:434. First use of current name combination.

CONTEXT AND CONTENT. Content as given in generic summary. The genus includes only one species, *Vampyrum spectrum*. Goldman (1917) proposed the name *V. s. nelsoni* for specimens from Mexico and Central America, but Husson (1962) suggested a return to the original monotypic species.

DIAGNOSIS. This is the largest bat in the New World. It resembles *Phyllostomus hastatus*, but the chin is smooth, as is that of *Chrotopterus auritus*. From *C. auritus*, *Vampyrum spectrum* can be readily distinguished by the shorter, finer pelage and the lack of a tail. The rostrum is elongated (Fig. 1), and the ears extend to the end of the muzzle when laid forward. The elongated skull (Fig. 2) is narrow (breadth less than one-third length) and has a well-developed sagittal crest in older individuals. The paraoccipital expansions are distinct, and the zygomatic arches are expanded both anteriorly and posteriorly. The dental formula is i 2/2, c 1/1, p 2/3, m 3/3, total 34. The molars are high but narrow, and the basic W-shaped ectoloph is modified but recognizable.

GENERAL CHARACTERS. This bat differs from other New World bats by its large size. Sexual dimorphism appears to be slight in the material we have examined. Selected measurements for both sexes may be found in Swanepoel and Genoways (1979) and in references therein. The ears are large and rounded, ranging in length from 39 to 42 mm. The noseleaf is large, averaging about 17 mm in length. Dorsally the fur is long, soft, and reddish brown in color, ventrally it is somewhat shorter and paler. The fur extends to the middle of the forearm. Wingspan ranges from 0.7 to 1.0 m. The interfemoral membrane is large and wide, and the calcar averages 37 mm long.

DISTRIBUTION. The known range of *V. spectrum* is from Veracruz, Mexico, southward to the island of Trinidad, Central Brazil, and Peru (Fig. 3). There is a record for Jamaica, but it is considered accidental or an error (Baker and Genoways, 1978). This species seems to be restricted to Neotropical forested regions, with an elevational range from sea level to 1,650 m (Peterson and Kirmse, 1969). There is apparently no fossil record.

FORM. The skull is robust, with a well-developed sagittal crest projecting beyond the foramen magnum. The inner upper incisors are well developed, broad distally, contact the outer incisors, and almost touch the canines. The outer incisors are much smaller (one-half the size of the inner) and are slightly higher in their insertion in the premaxillary. The upper canines are notably well developed; the cingulum bears a small posterointernal cusp. The first premolar is a small unicuspid. The second premolar is well developed, with an acute cusp. First and second upper molars are similar in shape and size with their W-pattern much modified. The last molar is quite reduced with only two main cusps present. Lower incisors are small and rounded; the inner pair is situated behind the outer. The incisors tightly occupy the space between the lower canines. Lower canines have well-developed cingula, which are almost in contact posteromedially (behind incisors). The three lower premolars are evenly aligned in the toothrow; the second is the smallest and the third is the largest. The three lower molars have high crowns with the cusps on the second the best developed; the first lower molar is slightly longer than the third, which lacks an entoconid.

The humerus is a strong, long, and sigmoidal bone. In cross section, the shaft is almost round and about 4 mm in diameter. The head of the humerus is well developed with a long pectoral ridge. The trochin (lesser tuberosity) extends beyond the head of the humerus. The distal end of the humerus terminates in a large capitulum, and the medial process is hammer-shaped, resembling those of other phyllostomids. As in all bats, the ulna is reduced and partially fused with the radius. The ulna articulates with the trochlea and capitulum of the humerus. Length of the radius often exceeds 100 mm and the bone is slightly convex. All carpals are tightly grouped, with the lunar, magnum, and centralis the largest. Metacarpals IV and V are very closely coupled. Measurements (mm) of wing elements of a female are as follows: metacarpal I 9.0, first phalanx 13.8, claw 0.87; metacarpal II 61.9, first phalanx 17.7; metacarpal III 78.1, first phalanx 44.7, second phalanx 42.7, third phalanx 27.7, terminal cartilage 3.5; metacarpal IV 82.0, first phalanx 34.1, second phalanx 34.7, terminal cartilage 3.6; metacarpal V 89.6, first phalanx 33.0, second phalanx 33.5, terminal cartilage 4.0. The claw is large, grooved, and recurved, resembling those of cats. In all fingers except I and II, there are small cartilaginous extensions at the tips, barely visible within the wings.

The femur is short and stout compared with other bats. The fibula is slender and is narrower proximally than distally. The tibia is long and slender. Tarsal bones are small. All metatarsal bones are slender and of similar size (ca. 7.5 mm) and shape. The calcar emerges from the tarsus and measures up to 40 mm. Digit I of the pes has only one visible phalanx (14 mm) and the claw (1 mm). Digits II to V have two visible phalanges with the following measurements (mm): II, first phalanx 8.1, second phalanx 6.4; III, first phalanx 7.7, second phalanx 5.7; IV, first phalanx 7.1, second phalanx 5.4; V, first phalanx 7.8, second phalanx 5.2. All the claws on these digits are grooved and well developed.

The vertebral column consists of 7 cervical, 12 thoracic, 6 lumbar, and varying numbers of sacral and caudal vertebrae. The pelvic region consists of 2 to 3 vertebrae fused with the ilium, 2 to 4 vertebrae fused into a urostyle, 2 vertebrae fused with the ischium, and 1 to 4 minute, vestigial caudals. The sternum is long

FIGURE 1. Adult *Vampyrum spectrum* from Panama (photo by Don E. Wilson).

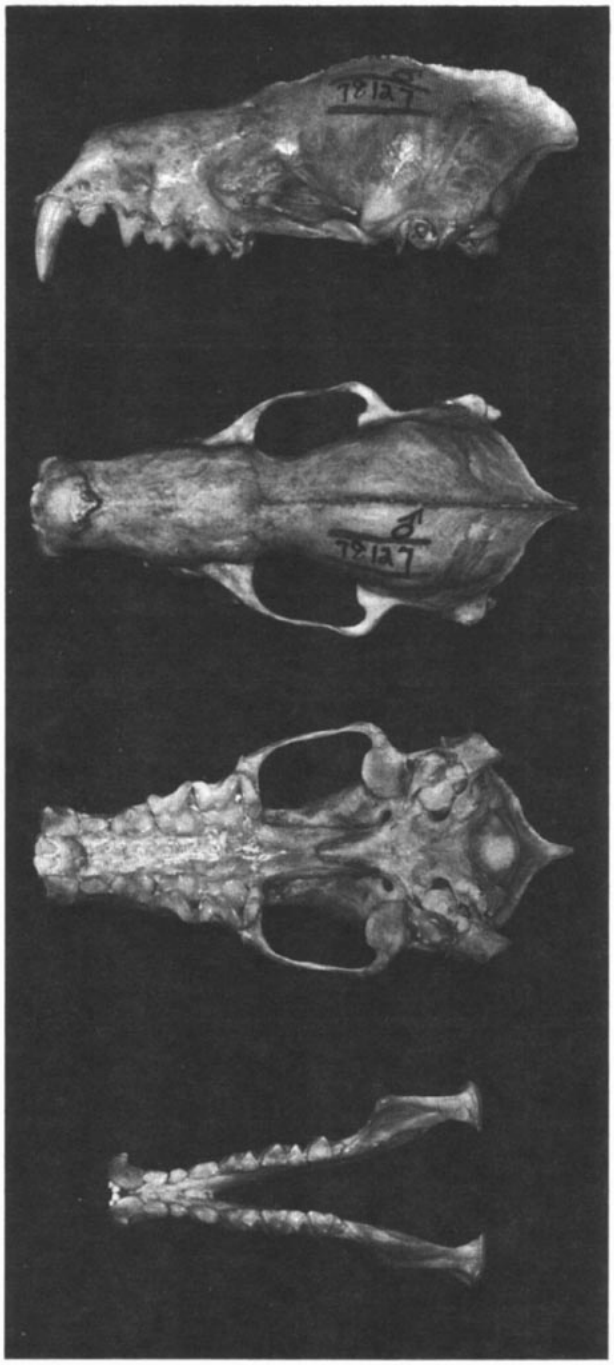

FIGURE 2. Skull of the holotype of *Vampyrum spectrum nelsoni*. Greatest length of skull is 51.2 mm. Photos by Alfred L. Gardner.

FIGURE 3. Geographic distribution of *Vampyrum spectrum*. The southern boundary is shown as 14°S after Cabrera, 1958.

and strong and the manubrium T-shaped. The first pair of ribs is short, heavy, and thick and the remaining ribs are less so. The third through ninth ribs are conspicuously broad dorsally. The scapula is long and flattened with a well-developed spine.

The anatomy of the brain was described by McDaniel (1976). Eisenberg and Wilson (1978) found that *Vampyrum*, like other carnivorous bats, has a brain : body weight ratio intermediate between insectivorous and frugivorous species.

Stomach morphology, described by Forman et al. (1979), resembles that of many species of the Insectivora.

FUNCTION. *Vampyrum spectrum* is a powerful and agile flier. On the basis of wing structure, Findley et al. (1972) postulated that false vampire bats flew "at low speeds in crowded flight spaces, maneuvering deftly, perhaps often landing to make captures, and having the low speed lift capabilities to carry off large prey items."

Echolocation and pulse design were investigated by Bradbury (1970). He found that during searching flights in laboratory conditions, *V. spectrum* produced pulses of 1.5 to 1.8 milliseconds (msec). The terminal phase pulses were very short, 0.5 msec or less. Novick (1977) explained that *Vampyrum* uses short pulses of low intensities because it flies close to obstacles and near to the ground. Bradbury's (1970) experiments demonstrated the ability of false vampire bats to discriminate between two similar targets.

ONTOGENY AND REPRODUCTION. Little is known about the reproductive cycle of *V. spectrum* (Wilson, 1979). Greenhall (1968) reported that a captive *V. spectrum* gave birth to a single young on 24 June. Ditmars (1936) reported the birth of a single young on 14 July. Gardner et al. (1970) collected a nonpregnant female in August. Navarro (1979) captured nonpregnant females in December, January, and April. Goodwin and Greenhall (1961) collected a lactating female in Trinidad in May. Births are apparently restricted to the end of the dry season or the beginning of the rainy season. Longevity data are scarce. Crandall (1964) reported a *V. spectrum* kept in captivity for 18 months. Greenhall (1968) kept one for 5 years.

ECOLOGY AND BEHAVIOR. Based on data reported by Deane (1967) and Marinkelle (1966, 1968), Ubelaker et al. (1977) listed a *Trypanosoma cruzi*-like haemoflagellate as occurring in *V. spectrum*. Peterson and Kirmse (1969) found an unidentified cestode. Ectoparasites identified were: *Hooperella vesperuginis* (Trombiculidae), *Paracesia longicalcar* (Trombiculidae), *Periglischrus iheringi* (Spinturnicidae) and *Trichobius parasiticus* (Streblidae) (Herrin and Tipton, 1975; Webb and Loomis, 1977).

Handley (1976) reported the following habitats for *V. spectrum*: lowlands and foothills, streamsides, evergreen forests, yards and swamps. The specimens collected at Los Tuxtlas, Veracruz, Mexico, were netted in primary tropical forest (Navarro, 1979). Gardner et al. (1970) captured *V. spectrum* in the same net that held several *Carollia* and *Artibeus*. Peterson and Kirmse (1969) captured *V. spectrum* in a mist net at the same locality as *Carollia castanea*, *Carollia perspicillata*, *Artibeus toltecus*, *Artibeus aztecus*, *Anoura geoffroyi*, *Glossophaga soricina*, *Vampyressa* sp., and *Desmodus rotundus*.

Because of its feeding preferences and its large size, *V. spectrum* occupies an ecological niche distinct from that of other bat species. This has been demonstrated in a two dimensional niche-matrix analysis by using food habits in one dimension and length of forearm or body weight in the other (Fleming et al., 1972; McNab, 1971).

Vehrencamp et al. (1977) studied a roost of *V. spectrum* in Costa Rica in 1973–74. The colony consisted of four large bats and one suckling young; two of the large bats were reproductive

adults and the others were presumed to be their offspring. The adult male, equipped with a radio transmitter, was followed during several foraging bouts, which lasted from 1 to 4.5 h. He apparently used a nearby river as a flyway to move between foraging areas on the edges of forests and tree clumps in pastures.

The bats brought prey back to the roost, suggesting that the adults provision the young. Eighty-six birds belonging to 18 species were identified from feathers in the roost. The birds ranged from 20 to 150 g in weight, some almost as big as the bats themselves. All species were foliage-roosting birds common to the nearby dry tropical forest. Many of the prey species were non-passerines, and several had a strong body odor, suggesting that olfaction may have played a part in prey location by *V. spectrum*. In addition, many of the birds were species that roost communally.

Daily time and energy budgets calculated for these bats reveal that a bat might need to consume only 38 to 48 kcal/day, yet an average 70 g bird is worth 105 kcal. This figure is consistent with the authors' impression that the bats did not leave the roost to forage on some nights.

Although earlier considered to be sanguivorous, *V. spectrum* is carnivorous (Goodwin and Greenhall, 1961). Greenhall (1968) kept an animal in captivity for over 5 years on a diet of white mice, birds, and raw meat. He noted that fruit was never eaten, which agrees with Howell and Burch (1974). Peterson and Kirmse (1969) found the remains of a heteromyid rodent and bats in the stomach of a specimen collected in Panama. Gardner et al. (1970) and Navarro (1979) reported that birds of the family Pipridae were eaten. Howell and Burch (1974) netted a *V. spectrum* in Costa Rica and kept it on a diet of bats. Villa (1966) assigned primarily frugivorous tendencies to this species and Navarro (1979) found an unidentified, red, seedless fruit in the stomach of one specimen. Gardner (1977) provided a literature review on the food habits of *V. spectrum*.

The most common roosting sites seem to be hollow trees. These bats roost solitarily, or in small groups. Based on data from Goodwin and Greenhall (1961), Walker et al. (1975) reported that groups of less than five individuals of both sexes have been found in roosts in Trinidad. Roosts were in the hollow trunks of *Ceiba pentandra*, *Mora excelsa* and *Spondias mombin*. Bradbury (1977) found these small groups to consist of an adult pair and recent young in Trinidad and Costa Rica.

GENETICS. Based on data from Baker (1973) and Baker and Hsu (1970), Baker (1979) summarized the information on *V. spectrum* as follows: diploid number, 30; number of autosomal arms, 56; X chromosome, submetacentric; Y chromosome, acrocentric.

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