Nyctomys de Saussure, 1860

Nyctomys de Saussure, 1860:106. Type species Hesperomys sumichrasti de Saussure, 1860.


Myoxomys Tomes, 1861:284. Type species Hesperomys (Myoxomys) saleini Tomes, 1861, by designation; described as a subgenus of Hesperomys Waterhouse, 1839.


CONTEXT AND CONTENT. Order Rodentia, suborder Sciurognathi, family Muridae, subfamily Sigmodontinae. The genus Nyctomys is monotypic (Musser and Carleton 1993).

Nyctomys sumichrasti (de Saussure, 1860)

Sumichrast’s Vesper Rat


Hesperomys (Myoxomys) saleini Tomes, 1861:284. Type locality “Dueñas, Guatemala.”

Sitomys (Phidomys) decolorus True, 1894:689. Type locality “Río de las Piedras,” Honduras.

Nyctomys nitellinus Bangs, 1902:30. Type locality “Bequete, . . . 4,000 feet,” Chiriqui, Panama.


Nyctomys sumichrasti (Bangs, 1902:30). First use of the current name combination.

CONTEXT AND CONTENT. Context as above. Nine subspecies of N. sumichrasti are recognized (Hall 1981).

N. s. colimensis Laurie, 1953:390. Type locality “Juarez, Colima, Mexico.”

N. s. costaricensis Goldman, 1937:422. Type locality “San Geromino, El Pirris, hamlet on the main road to Pirris before reaching Jabillo, about the west coast of Costa Rica, about two miles before the abrupt descent to the lowlands of Pacho Azul and about 12 miles inland from Pirris (altitude about 100 feet),” = Pantarronas, Costa Rica (Hall 1981:630).

N. s. decolorus (True, 1894:689), see above.


N. s. nitellinus (Bangs, 1902:30), see above.

N. s. pallidulus Goldman, 1916:420. Type locality “Santo Domingo, 8 miles west of Lagunas, on the Mexican National Railroad, Istmus of Tehuantepec, Oaxaca, Mexico (altitude 900 feet),”

N. s. salisini (Tomes, 1861:284), see above.

N. s. sumichrasti (de Saussure, 1860:107), see above.


DIAGNOSIS. Nyctomys sumichrasti (Fig. 1) is similar to the slightly smaller tucatán vesper mouse (Otonyctomys hatti), with which it is sympatric in Belize. N. sumichrasti has a longer maxillary toothrow than O. hatti (Genoways et al., in press) and is heavier (40–67 g) than O. hatti (<36 g). N. sumichrasti (length of hind foot, 22–27 mm) is similar to the larger Mount Pirri climbing mouse (Rhipidomys scandens, length of hind foot, 29–32 mm), with which it is allopatric in eastern Panama (Reid 1997). N. sumichrasti may be distinguished from other murids by its color and dark ocular blotches (Ceballos and Miranda 2000).

GENERAL CHARACTERS. Nyctomys sumichrasti is a medium-sized stocky rat with tawny-brown to orange upperparts and well-demarcated creamy-colored underparts (Reid 1997). Nyctomys sumichrasti has a large head. Whiskers are long, and ears are small but longer than they are wide. Tail is robust, cylindrical (de Saussure 1860), well haired, and tufted terminally (Ellerman et al. 1941). Hind feet are short and wide; toes are long, except for 1st toe; 4th toe is the longest (de Saussure 1860). Hallux is clawed. Pad of pollex may be prominent (Ellerman et al. 1941). Six plantar pads are present, with 1st through 4th interdigitalis close together; 1st and 4th digits oppose each other; linear and hypothenar pads are close behind interdigitals; plantar surface is naked or only lightly furred on heel (Carleton 1960). Claws are compressed and recurved as an adaptation for an arboreal lifestyle (Goldman 1916).

Eyes are large and rimmed with narrow black rings that may be faint and extend forward as a dusky smudge at base of nose and whiskers (Emmons 1997). Eyes reflect a moderately bright, reddish eyeshine (Reid 1997). Hair is soft and thick. Overall, body appears reddish-brown or orange and is somewhat brighter on sides and muzzle. Hairs on upperparts are reddish at tips and slate-colored at roots. Underparts are white. Fronts of forelegs are reddish-brown, and toes are whitish gray. Tops of hind feet are pale reddish-brown. Ears are reddish-brown and whiskers are blackish. Tail is solid brown to reddish-brown. At base of tail, hair is thinner and lies flat, but away from base hair becomes more plentiful and longer. Hairs are bristly on distal 3rd of tail and resemble a long paintbrush terminally (de Saussure 1860).

Several subspecies are darkened along middle of back, head, and rump by a slight mixture of brown-tipped hairs (Bangs 1902; Goldman 1916; Laurie 1953). Pelage of individuals in Nicaragua does not differ between wet and dry seasons (Genoways and Jones 1972). Individuals in dry lowlands tend to be smaller and more brightly colored, whereas those in higher wetlands are larger and darker (Reid 1997). Sumichrast’s vesper rats from Panama and Costa Rica sometimes are red-brown, whereas their young are gray-brown, with woolly fur, until they reach almost adult size. Those from Mexico are bright rust, with young the same color as adults (Emmons 1997).

Measurements of individuals of N. sumichrasti from across the range suggest a general increase in size from north to south (Bangs 1902; Goldman 1916, 1937; Goodwin 1969; Laurie 1953). Average of external measurements (in mm; range and sample size in parentheses) of adult males and females, respectively, from Nicaragua are total length, 236 (225–246, 3), 230 (219–246, 3).
maxillary toothrow, 4.4 (4.3–4.6, 12), 4.5 (4.2–4.7, 19); length of incisive foramen, 5.1 (4.8–5.6, 14), 5.1 (4.3–6.3, 24); length of palatal bridge, 4.4 (4.0–4.7, 15), 4.4 (3.9–4.7, 24—Genoways and Jones 1972).

**DISTRIBUTION.** *Nyctomys sumichrasti* occurs (Fig. 3) from southern Jalisco and southern Veracruz, Mexico, south to central Panama, excluding the Yucatán Peninsula (Musser and Carleton 1990). Elevational range is from sea level to 1,600 m (Mendez 1993; Timm et al. 1989). No fossils are known.

**FORM AND FUNCTION.** Cheekteeth are complex. Molars are relatively low crowned (Carleton 1980). Anterior intertooth cusp of M1 is strongly reduced, with well-defined islands between each pair of cusps; M3 is large (Ellerman et al. 1941). Dental formula is i 1/1, c 0/0, p 0/0, m 3/3. The maxillary toothrow, 4.4 (4.3–4.6, 12), 4.5 (4.2–4.7, 19); length of incisive foramen, 5.1 (4.8–5.6, 14), 5.1 (4.3–6.3, 24); length of palatal bridge, 4.4 (4.0–4.7, 15), 4.4 (3.9–4.7, 24—Genoways and Jones 1972). 

Nyctomys sumichrasti has a broad braincase and frontals with well-developed supraorbital ridges that extend across parietals to occiput (Fig. 2). Interparietals are broad and large; they completely separate parietals from supraoccipital. Rostrum is short. Zygomatic plate is narrow, but straight anteriorly. Infrabraincase foramen is prominent. Tympanic bullae are small. Broad palate, which ends in front of posterior part of toothrow, has no lateral pits (Ellerman et al. 1941). Average cranial measurements (in millimeters, range and sample sizes in parentheses) of adult males and females, respectively, from Nicaragua are occipitonasal length, 29.8 (28.5–31.2, 14), 29.7 (28.5–31.1, 18); zygomatic width, 17.1 (16.4–18.0, 12), 16.8 (15.8–17.8, 18); interorbital constriction, 5.6 (5.4–6.2, 14), 5.5 (5.3–6.0, 23); width of braincase, 13.2 (12.8–13.6, 14), 13.2 (12.4–13.6, 22); rostral width, 5.7 (5.3–6.0, 15), 5.7 (5.2–6.4, 22); length of rostrum, 10.2 (9.7–11.0, 14), 10.2 (9.4–10.7, 20); depth of cranium, 11.1 (10.5–11.6, 12), 11.0 (10.2–11.5, 21); length of maxillary toothrow, 4.4 (4.3–4.6, 12), 4.5 (4.2–4.7, 19); length of incisive foramen, 5.1 (4.8–5.6, 14), 5.1 (4.3–6.3, 24); length of palatal bridge, 4.4 (4.0–4.7, 15), 4.4 (3.9–4.7, 24—Genoways and Jones 1972). 

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vesiculans. The specimen had paired ovate bulbourethral glands that lay cranial and lateral to urethral bulbs. These glands were drained by a single duct, which entered urethra anterior to origin of phallus. Ampullary glands were 5 by 5 mm and were filiform. Each gland discharged into vas deferens through numerous ducts. The specimen had only a single set of prostate glands. Each prostate was made up of 4 units. Each duct was drained by a single duct that entered prostatic urethra laterally and dorsally to the ampulla; each duct was 15 by 3 mm and was composed of 2–3 branching tubules (Arata 1964). A subsequent study of 5 specimens revealed 2 pairs of preputials and a single bulbourethral gland. Lateral preputials were large and extended well beyond ventral flexure of penis, whereas medial, ventral glands were smaller. Conventional ducts entered urethra, and inferior prostates and vesiculans were lacking (Voss and Linzey 1981). A branched gland identified as a modified anterior prostate in initial study (Arata 1964) was identified subsequently (Voss and Linzey 1981) as a dorsal prostate based on form and lack of vesiculans. One of 5 specimens examined had a single small pair of ventral prostates (Voss and Linzey 1981).

**ONTOGENY AND REPRODUCTION.** Individuals of *N. sumichrasti* may be separated into 3 age classes (juvenile, subadult, adult) based on tooth wear, cranial measurements, and body measurements. In Nicaragua, sex ratio for all age groups combined did not differ significantly from 1:1. All age classes were equally represented in the population (Genoways and Jones 1972).

* Nyctomys sumichrasti* has 2 pairs of mammae (Ellermann 1941). In captivity, average size of litter was 2 (n = 11, range 1–3), 1 female produced 5 litters in 7 months, and gestation period was 30–38 days (Birkendorf and Wirtz 1965).

Breeding occurs in both wet and dry seasons. In Panama, pregnant females were present in February and June; lactating females were present in March; some subadult females showed evidence of breeding. From December to June, all males had scrotal testes (Fleming 1970). In Costa Rica, an adult male had scrotal testes measuring 7 by 14 mm on 7 August (Timm et al. 1989).

In captivity, mating began with the male chirping at the female at 5–10 s intervals for 3.5 min. The male mounted the female for 30–40 s. Both animals squawked during copulation, which consisted of short, slow thrusts. Copulation was followed by self-grooming that lasted for 2 min in the male and 2–3 s in the female (Birkendorf and Wirtz 1965).

In captivity, adults of both sexes built globular nests in which partitioning occurred. The male sometimes stayed in the nest with the adult female and young but usually stayed outside for up to 7 days after birth. The adult female protected young by rushing to them and attempting to bite objects introduced into the nest. Such a disturbance, the female rearranged young beneath her and covered herself with bedding material. Young Sumichrast’s vesper rats remained attached to nipples of the mother for most of the first 2 weeks of life. They were detached if the mother voluntarily left the nest but remained attached if she was disturbed (Birkendorf and Wirtz 1965).

Total length, length of tail, and length of hind foot of 2 neonates from different captive litters were 77.0, 22.5, 10.0 and 72.0, 22.0, 9.5 mm, respectively; both weighed 4.7 g. Young were born with haired upperparts and naked venters, erupted lower incisors, toes fused except for distal 25%, and soft, distinct claws. Newborn Sumichrast’s vesper rats made feeble squeaks and executed crawling movements with forelimbs. Pinnas unfolded on 1st day. By end of 1st week, pelage took on a glossy appearance; hair was fawn-colored on sides, brownish-gray middorsally, white on venter, and black on tail, ears, nose, and eyelids. Toes, which carried sharply-hooked claws 1.3 mm in length, were completely separated by end of 1st week. Coordination increased rapidly during 1st week. At 2 days of age, they were able to crawl slowly; at 3 days could crawl slowly with finger held upright, and by 5 days could climb with front legs. By end of 2nd week, movements were well coordinated; young could climb on branches using all 4 legs and right themselves if turned over. When disturbed, they made rapid cirps. Young ≤14 days old chilled quickly when removed from nest. By 14 days, pelage pattern resembled that of adult. Nursing stopped during week 3. Eyes opened at 15–18 days of age; thereafter, young showed little fear. They left the nest at 17 days. They crawled slowly along branches and ran with rapid spurts. Vibrate ears and eyes twitched rapidly. Young occasionally shuddered between active periods (Birkendorf and Wirtz 1965). In Nicaragua, juveniles were molting in March and July; molt from juvenile to adult pelage begins ventrally, proceeds over sides to meet middorsally, then proceeds anteriorly and posteriorly, with head and rump molting last (Genoways and Jones 1972). Molt into adult pelage normally occurred during 4th week (Birkendorf and Wirtz 1965). Adult *N. sumichrasti* were molting in July; no molting pattern was discernable in adults or subadults (Genoways and Jones 1972). Vibrate ears grew to 50 mm in length by end of 4th week and to 63 mm by end of 9th week.

At 2 months of age, 2 males born in mid-June reached the subadult stage of development and had testes measuring 5 by 3 mm and 4 by 3 mm (Sánchez-Hernández et al. 1999). Body mass of adults was attained when >2 months old (Ceballos 1990). Sexual maturity was noted in some individuals at ca. 75 days (Birkendorf and Wirtz 1965).

**ECOLOGY.** In Jalisco, Mexico, *N. sumichrasti* feeds on hard fruits of false evergreen needle bush (*Jacquinia pangens*). Captive animals thrived and reproduced on a diet of oats, seeds, and fruits including calabash tree (*Crescentia alata*), purple mombin (*Spondias purpurea*), and wild almond (*Terminalia catappa*—Ceballos 1990). In Nicaragua, food consisted primarily of fruits, seeds, and other vegetable matter. During the wet season, individuals ate fruits of borage (*Cardia diversifolia*). In the dry season, they ate figs (*Ficus*—Genoways and Jones 1972). *N. sumichrasti* also feeds on fruits of madders (*Hoffmannia* and *Psychotria gracilis*—Eisenberg 1989) and on moths (*Lepidoptera*—Reid 1997). In Costa Rica, a Sumichrast’s vesper mouse fed on leaves of *Daphnopsis americana*, which contains several poisonous secondary plant compounds. It ate only the sides and tip, avoiding the midrib. Only young leaves were consumed (Timm and Wietze 2005).

Throughout its range, *N. sumichrasti* occurs in evergreen lowland and lower montane forests, old secondary and riparian forests, and semideciduous forests (Emmons 1997). In Jalisco, Sumichrast’s vesper rat occurred in arroyo forest habitat (Ceballos 1990). In Colima, it was on the edge of a coconut grove, in thick, thorny undergrowth in a tree ca. 0.5 m aboveground. This location was <1 km from the ocean and <3 m above sea level (J. L. Hunt and T. L. Best, pers. comm.). In Oaxaca, *N. s. pallidulus* inhabits arid wooded mountain slopes on the southern side of the Isthmus of Tehuantepec, whereas *N. s. sumichrasti* inhabits more humid areas in northern Oaxaca (Goodwin 1969). In Veracruz, 1 was in a cane thicket (Sumichrast 1882). In Panama, *N. sumichrasti* occurs in 2nd-growth, dry tropical forest (Fleming 1970). *N. sumichrasti* is distributed in evergreen forest of central and western Panama (Handley 1966).

In Nicaragua, *N. sumichrasti* occurs in cloud forest where understory has been cleared for agriculture and was in dense, 2nd-growth scrub forest along a small stream (Jones and Genoways 1970). Also in Nicaragua, it was in semievergreen forest with a tropical wet-and-dry climate in a riparian remnant running through sugar cane fields. Vegetation was composed of borage (*Cardia diversifolia*) and 2 species of madders (*Rubiaeaceae*), with woody vines intertwined (Genoways and Jones 1972). *N. sumichrasti* is ecologically similar to *Ototylomys phyllotis*, but in Nicaragua, where the species are sympatric, competition between the 2 appears to be minimal because *O. phyllotis* usually remains at a lower level than *N. sumichrasti* (Lawlor 1969).

In Nicaragua, the trichobitus *Microtetranychus mesoamericanus* has been reported from Sumichrast’s vesper rat (Webb and Loomis 1971). Also in Nicaragua, 36 of 85 specimens harbored the laelapid mite, *Androlaelaps fahrenholzi*; 10 carried another undescribed species of *Androlaelaps*, and 1 had another laelapid (*Eubrachyelaecus circularis*). Three specimens had a trombiculid mite (*Androlaelaps longicuspis*). One specimens collected from *Nyctomys sumichrasti* included a trombiculid, *Spleocola secunda* (from 1 specimen); a tick, *Ornithodoras talae* (from 3 specimens); and unidentified *Ornithodoras* (from 1 specimen). Mites (*Eutrombicula alfreddugesi* and *Listrophorus*) also were found (Genoways and Jones 1972). One of 4 specimens from Panama harbored a cerothyllid fly (*Pheochetae dolens*—Tipton and Méndez 1966). Lactating nites (*Huenolaelaps glasgowi*) were on 4 females from Panama (Tipton et al. 1966). *Mites* (*Paralabidosphorus gutuena*—from 3 specimens) were found on 3 females from Costa Rica (Tipton et al. 1966).
lensis and Echimysopus nyctomys) were on specimens from Guatemala (Mendez 1993).

A specimen injected with Trypanosoma cruzi showed a high resistance to infection (Petana 1969). One of 8 specimens examined in Belize was infected with leishmaniasis (Leishmania mexicana). The infection resulted in a 5-mm bump at the base of the tail and abundant Leishmania Donovani bodies (Laingon and Stannard-Bix- on 1964). Leishmania mexicana has been collected from Nycto-
mys sumichrasti in Belize for use in research (Bray 1983).

BEHAVIOR. Nyctomys sumichrasti inhabits middle and upper
levels of forest, usually above 3 m and at least as high as 22 m; it rarely descends to the ground (Emmons 1997; Timm and LaVal 2000). In Jalisco, an adult male was flushed in a small, subhumid, subboreal forest by hammering on a downed tree trunk (Lopez-Forment et al. 1971). In Jalisco, 5 individuals were captured in trees at heights of 0.7–7.0 m (Ceballos 1990). In another study in Jalisco, 8 individuals were captured in traps placed in trees; none was captured on the ground in 8,400 trap nights (Collett et al. 1975). In Nicaragua, N. sumichrasti was observed low in forest, at heights of 3–4 m. During the wet season, it remained much higher in fig trees (Ficus), where it appeared to be feeding. It rarely came to the ground; few individuals near ground were adults (Gen-
oways and Jones 1972). In Costa Rica, Nyctomys sumichrasti may be common in the forest, but seldom is observed because of its nocturnal habits (Timm et al. 1999).

Nests may be on branches or in tree cavities. In Jalisco, 4 nests were made of plant fibers and leaves in the upper forks of trees (Ceballos 1990). In Veracruz, Mexico, tree cavities used for nesting were 15–33 cm in diameter with an opening in the trunk of 3–7 cm in diameter. Nests, which were irregular masses of shredded bark at the bottom of the hollow, were often built on top of older nests; 1 hollow contained 5 layers of nesting material. Nests had a central cavity in the form of a flattened sphere ca. 10 cm across and 8 cm high. Insects, spiders, and scorpions were in nests, but no ectoparasites (Hall and Dalquest 1963). In Panama, a nest was in a hog plum tree (Spindias mobilin—Fleming 1970). In Costa Rica, Sumichrast’s vesper rat may inhabit buildings, where it may make nests in papers or clothing (Timm and Vriesendorp 2003).

In Panama, individuals of both sexes and all ages used the same arboreal pathways. Home ranges included both horizontal and vertical dimensions. Average distance between successive captures for 3 females was 28–54 m, with greatest distance between successive captures 30–100 m. Average distance between successive captures for an adult male was 69 m; greatest distance was 131 m (Fleming 1970).

Sumichrast’s vesper rat is agile in trees, but less so on the ground. When released after capture, individuals immediately ran up trees or bounded for a short distance along the ground before climbing (Fleming 1970). It runs relatively slowly (Hall and Dalquest 1963). When disturbed in her nest by day, a mother will flee along horizontal branches, with her young clinging tightly by their mouths to her teats (Emmons 1997).

In captivity, N. sumichrasti moves deliberately when feeding, manipulating food, or grooming but travels in a quick, jerky, man-
er, even when not excited. The animals twitch their vibrissae and move ears backward and forward independently when exhibiting inquisitive behavior. Tail is carried over back during climbing.

Their mouths to her teats (Emmons 1997). They often perched lapsed ca. 3 h, followed by another bout of feeding and activity. In a captive experiment, N. sumichrasti was more loyal to location of a nest box than to the nest box itself, although the box retained a strong odor (Birkenholz and Wirtz 1965).

In captivity, commonest vocalization was a faint, rapid, high-
pitched, almost-musical chirp or trill given when the animal was excited or when young were at play. Adult males sometimes di-
rected a low-pitched “groom” ca. every 5 s for ≤1 min toward their mate Donovon bodies (Laingon and Stannard-Bixon 1964). The infection resulted in a 5-mm bump at the base of the tail and abundant Leishmania Donovani bodies (Laingon and Stannard-Bixon 1964)

SUMMARY. Nyctomys sumichrasti was observed hanging by its hind feet in a strong wind. In the wild, N. sumichrasti make calls consisting of single chirps of a peak frequency of 3.5 kHz repeated at irregular intervals. These vocal-
izations are used to locate and navigate toward prospective mates (Timm and LaVal 2000).

In captivity in a large cage, Sumichrast’s vesper rat remained in family groups but would not tolerate, and was aggressive toward, introduced strangers. Animals reared separately often did not as-
ociate when paired, and placing strangers in enclosures with es-

dated pairs resulted in injuries from fighting (Birkenholz and Wirtz 1965). Aggressive behavior toward strangers may include hisses and squeaks (Reid 1997). One lived in captivity for 5 years and 2 months. Individuals occasionally slow away on banana boats, reaching the United States (Nowak and Paradiso 1983), but no populations have become established.

GENETICS. The diploid number of chromosomes is 50–52 (Bradley and Ensink 1983; Haiduk et al. 1998; Lee and Alvarez 1977). Karyotype of a female N. s. florencei from Honduras con-
sisted of 1 large and 1 small pair of biarmed chromosomes, 22 pairs of acrocentric somatic chromosomes, and a pair of a large subtelocentric X chromosomes (Bradley and Ensink 1983; Lee and Elder 1977). Karyograms of 1 male and 1 female N. s. sumichrasti from Jalisco are similar in simplicity to those of Dieomys taylori, Tylosoma panamensis, and several species of Neotoma and Pero-
mus. Karyotype is different in appearance from that of members of the thanomysine group, neotomyine-peromyscine group, and South American cricetines (Lee and Elder 1977).

REMARKS. Nyctomys sumichrasti is endemic to Middle
America, and the taxon is of enigmatic phylogenetic position. Hersh-
kowitz (1962) placed it with thanomysine group of South American sigmodontines. Others suggest distant kinship to neotomine-pero-
myscines or a cladistic origin prior to both North and South Amer-
ican sigmodontines (Carleton 1980; Voss and Linney 1980). Based on external structure and G-bandable chromosomes, Nyctomys may be more closely related to Neotoma than to Orozyomys (Burt 1966; Haiduk et al. 1998). Nyctomys may be most closely related to Otontomys; these genera from a sister group to 2 other Middle American endemics Tylosom and Otoptomys. The 4 genera may be remnants of a clade that diverged relatively early in evolutionary history of sigmodontine rodents (Carleton 1980; Tang et al. 1995; Steppan 1995). Following Carleton (1980), Reig (1983) arranged Nyctomys and its 3 close generic relatives in the separate subfamily Tylomyinae.

Nyctomys is from the Greek nys meaning night and nys-
meaning mouse (Jaeger 1955). The specific epithet sumichrasti is a patronym for F. Sumichrast, who collected the 1st specimen (Al-
varez 1963). Local names for N. sumichrasti include ratón trepador (Eisenberg 1989), rato cosechadora de Sumichrasti, and rata ves-
pertina (Mendez 1993).

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