MAMMALIAN SPECIES No. 166, pp. 1–4, 5 figs.

Ectophylla alba.

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Published 25 May 1982 by The American Society of Mammalogists

Ectophylla H. Allen, 1892

Ectophylla H. Allen, 1892:442. Type species *Ectophylla alba* by original designation.

CONTEXT AND CONTENT. Order Chiroptera, Family Phyllostomidae, Subfamily Stenodermatinae, Tribe Stenodermatini. The genus *Ectophylla* contains one living monotypic species, *Ectophylla alba*, as treated below. *Mesophylla* is recognized here as warranting full generic status rather than being considered a subgenus of *Ectophylla* in accordance with Gardner (1977), Greenbaum et al. (1975), Jones and Carter (1979), and Starrett and Casebeer (1968).

Ectophylla alba H. Allen, 1892

Honduran White Bat

Ectophylla alba H. Allen, 1892:442. Type locality [vicinity of] Segovia River, Eastern Honduras [="Comarca de El Cabo, northern Nicaragua"] (Miller and Kellogg, 1955:77).

CONTEXT AND CONTENT. As noted in the generic summary. *Ectophylla alba* is considered a monotypic species. The holotype, a male, was collected by C. H. Townsend, and is a skin, stuffed with cotton, preserved in alcohol, without skull, National Museum of Natural History (USNM) 15950.

DIAGNOSIS. Because the genus *Ectophylla* includes only one species, the following diagnosis applies to genus and species.

Overall size of *E. alba* is small for stenodermatines: head and body length (in mm), 37 to 47; hindfoot, 7 to 10; ear, 10 to 15; forearm, 27.8 to 29.3; weight, 5 to 6 g; tailless. Color of fur is bright white over most of body. Hair on both dorsal and ventral surfaces of the head and body is lightly tipped with grey; the pigmented tip becomes progressively longer and darker posteriorly. Eye is ringed with grey. Wing membranes are black except for second interdigital membrane, which is unpigmented. The uropatagium is pale and hairless. Ears, tragus, noseleaf, lips, and skin covering wing bones are a bright yellow-orange. Ears are moderately large and rounded. Inner margin of tragus is convex and bears one small indistinct lobe; outer margin has 4 or 5 small lobes, which appear as coarse serrations. Noseleaf bears small serrations along its margins. Mentum has a row of 8 to 10 small warts on edge with a second row of 4 small papillae immediately behind first (Casebeer et al., 1963; Goodwin, 1942, 1946).

Dental formula is i 2/2, c 1/1, p 2/2, m 2/2, total 28. The skull shape is typical for stenodermatines, but is characterized by exceedingly deep basioccipital pits. The skull and lower jaw are illustrated in Figs. 1, 2, and 3.

GENERAL CHARACTERS. Males average slightly larger than females for several characters, but sexual dimorphism has yet to be adequately documented.

Measurements (in mm) of the holotype as given by Allen (1892): length of head and body, 36; length of arm, 17; length of forearm, 25; first digit, length of first metacarpal bone, 3, length of first phalanx, 3; second digit, length of second metacarpal bone, 21, length of first phalanx, 3.5; third digit, length of third metacarpal bone, 25, length of first phalanx, 9, length of second phalanx, 12, length of third phalanx, 6; fourth digit, length of fourth metacarpal bone, 25, length of first phalanx, 7.5, length of second phalanx, 8; fifth digit, length of fifth metacarpal bone, 25, length of first phalanx, 6, length of second phalanx, 7; length of head, 14; height of ear, 10; height of tragus, 5.5; length of thigh, 8.5; length of tibia, 10; length of foot, 8; length of interfemoral membrane, 4.

Allen (1898) did not include measurements of the skull or dentition in his description of the then second known specimen (the skull of the holotype was missing); however, measurements of this specimen, an adult male [British Museum (Natural History) 97.4.7.6], were reported by Goodwin and Greenhall (1962) as follows: length of forearm, 26; greatest length of skull, 16.8; zygomatic breadth, 10.0; interorbital breadth, 4.2; palatal breadth, M2–M2, 7.5; mastoidal breadth, 8.4; breadth of braincase, 8.0; maxillary toothrow, C–M2, 6.3.

Measurements of three females from Costa Rica as reported by Casebeer et al. (1963): length of head and body, 40, 37, 41; length of foot, 9, 8, 9; length of ear (from notch), 13, 12, 13; length of forearm, 27.8, 28.5, 29.3; total length of skull, 16.5, 16.2, 16.6; condylobasal length, 15.3, 15.1, 15.4; zygomatic breadth, 9.9, —, 10.5; mastoid breadth, 8.0, 8.2, 8.7; palatal length, 8.1, 8.0, 8.1; postorbital constriction, 4.2, 4.1, 4.4; length of maxillary toothrow, 6.2, 6.0, 6.1; length of mandible, 11.3, 11.1, 11.5; length of mandibular toothrow, 6.8, 6.6, 6.8. Starrett and Casebeer (1968:13) also provided measurements for Honduran white

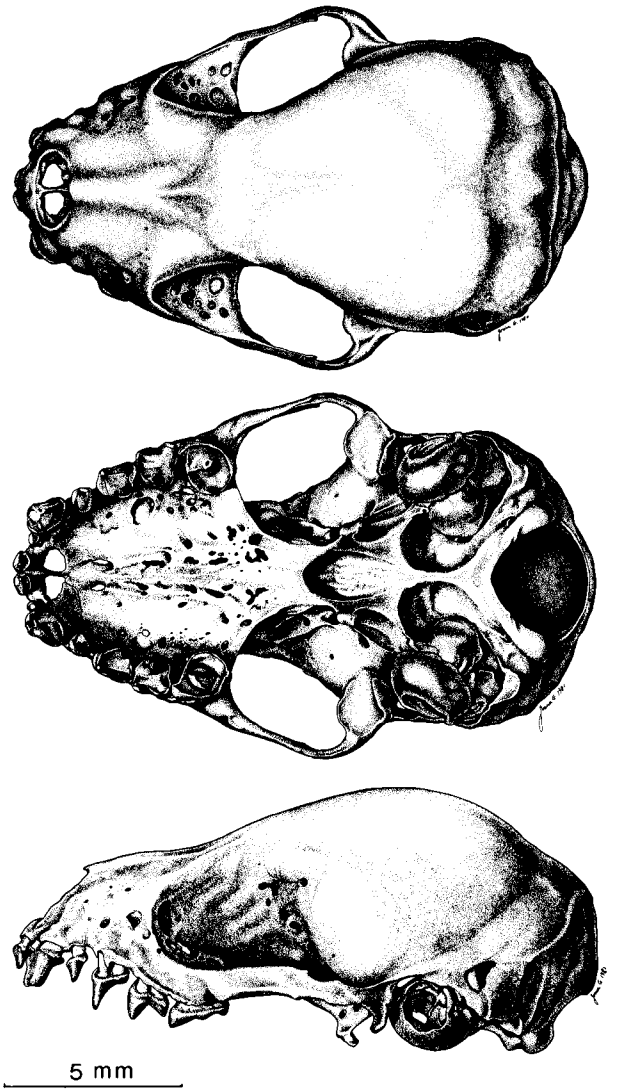

FIGURE 1. Dorsal, ventral, and lateral views of the cranium of an adult female *Ectophylla alba* from Finca La Selva, 1 km SW Puerto Viejo, Heredia Province, Costa Rica.

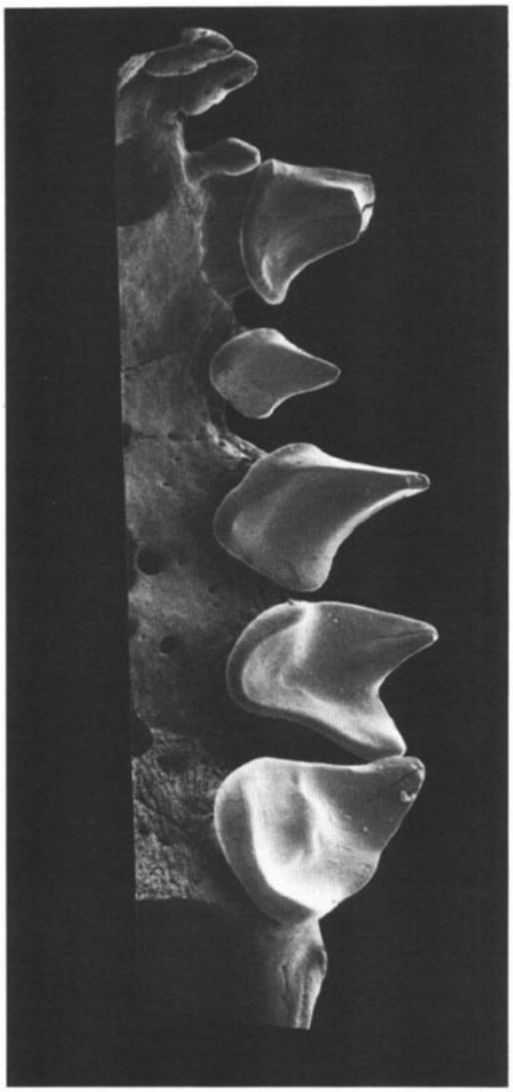

FIGURE 2. Ventral view of the left upper toothrow of *Ectophylla alba*.

FIGURE 3. Dorsal view of the lower jaw of *Ectophylla alba*.

bats captured in Costa Rica, as follows: length of forearm (male, 2 females), 28.1 (dry), 28.6, 29.5; (cranial, male) greatest length of skull, 17.0; condylobasal length, 15.8; length of maxillary toothrow, C–M2, 6.1; zygomatic breadth, 10.6; breadth of braincase, 6.2; mastoid breadth, 8.8; alveolar breadth across upper canines, 4.3; breadth across M2–M2, 7.6; length of mandibular toothrow, c–m2, 6.6. Measurements from additional specimens, also from Costa Rica, were reported by Gardner et al. (1970:722) as follows (mean and range for seven males and two females, unless otherwise noted): forearm (eight males, two females), 28.3 (26.4 to 29.6); greatest length of skull, 16.6 (16.1 to 17.0); condylobasal length, 15.4 (14.9 to 15.8); zygomatic breadth, 10.2 (9.7 to 10.8); mastoidal breadth, 8.4 (8.2 to 8.6); breadth of braincase, 7.8 (7.5 to 8.2); postorbital constriction, 4.3 (4.1–4.5); breadth across M1–M1, 7.3 (7.0 to 7.7); maxillary toothrow, 6.1 (5.9 to 6.3); mandibular toothrow, 6.5 (6.2 to 6.6); weight (six males, two females), 5.5 (4.5 to 6.2). Additional measurements were provided by LaVal and Fitch (1977) and Swanepoel and Genoways (1979).

DISTRIBUTION. *Ectophylla alba* is found only in the Caribbean lowlands of Central America; specimens are known from eastern Honduras, eastern Nicaragua, eastern Costa Rica, and western Panamá (see Fig. 4). Specific published localities are as follow: COSTA RICA—*Cartago:* Turrialba, Instituto Interamericano de Ciencias Agricolas, 600 m (Gardner et al., 1970; Starrett and Casebeer, 1968); *Heredia:* Finca La Selva; 1 km SW Puerto Viejo, 100 m (Casebeer et al., 1963; Greenbaum et al., 1975; LaVal, 1977; LaVal and Fitch, 1977; Starrett and Casebeer, 1968; Timm and Mortimer, 1976); *Limón:* Colonia ITCO de Cariari (on Río Tortuguero), Vesta (Gardner et al., 1970). HONDURAS—*Olancho:* 40 km E Catacamas, el. 500 m (W. B. Davis, in litt.). NICARAGUA—*Rivas:* San Emilio, on the south–central shore of Lake Nicaragua (Allen, 1898; and see Howell, 1964); *Zelaya:* 4½ km NW Rama (Greenbaum and Jones, 1978); *Comarca de El Cabo:* Segovia River [type locality] (Allen, 1892). PANAMA—*Bocas del Toro:* Almirante, upper Río Changena (2,300–2,400 ft); and Sibube (Handley, 1966).

FORM AND FUNCTION. Gardner and Wilson (1971:855) described a thin layer of melanistic pigmentation over the cranial musculature and postulated that "the melanized cap over the skull would intercept ultraviolet solar radiation potentially harmful to the brain." Timm and Kermott (1982) demonstrated that melanistic granulations over the parietal region of the African striped mouse, *Rhabdomys pumilio,* were exceedingly effective in absorbing the shorter wave lengths of ultraviolet radiation (250 to 300 nm). They described the subcutaneous melanin deposits of *Ectophylla* as "quite different from those found in the murid rodents. In all four genera of murids, the extracranial melanin lies as a dense layer on the skull within the periosteum. In *Ectophylla,* melanin is deposited as scattered granulations above the cranial musculature, just beneath the skin," and they postulated that rodents and bats may have resolved a common problem in a convergent manner by "deposition of subcutaneous melanin over the skull."

REPRODUCTION. Females apparently bear only a single young, as in most phyllostomids. Casebeer et al. (1963:188) reported capturing two pregnant females at Finca La Selva, Costa Rica, "one specimen taken on 17 June 1961, contained a small embryo; the specimen taken on 24 July 1961 contained an embryo measuring 10 mm from crown to rump." Gardner et al. (1970: 722) reported "One female contained a 13-mm embryo on 1 March and another was lactating on 23 April," and six males taken in March and April had "enlarged testes, averaging 4.6 × 4.0." An adult male captured at La Selva on 19 July 1974 had testes measuring 3 × 2. Also at La Selva, LaVal (1977:80) reported that of six female *E. alba* he captured "Females were pregnant in February and August, one was lactating in March,

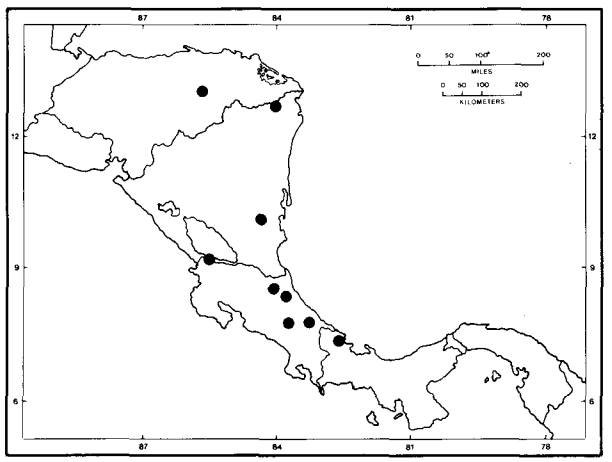

FIGURE 4. Map of Central America showing the distribution of *Ectophylla alba*.

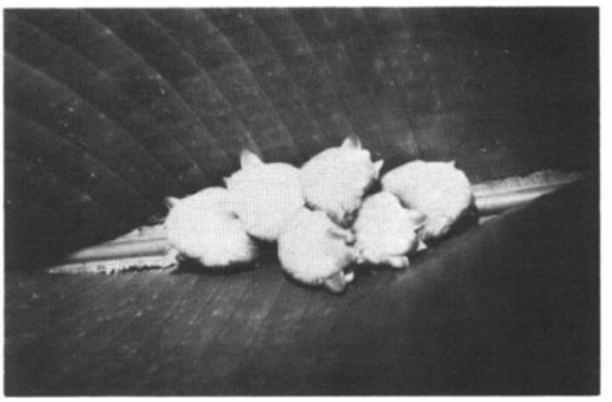

FIGURE 5. Photograph of a colony of six *Ectophylla alba* roosting in a tent on *Heliconia tortuosa*. Details of the cut side veins may be seen along the midrib of the leaf. (From Timm and Mortimer, 1976. Reprinted with permission of Ecology.)

and one post-lactating in September, another in November." The time period from May through August corresponds with the rainy season in the Caribbean lowlands of Central America, although the two driest months, at La Selva, February and March, each receive an average of 200 mm of rain. During the wet season, rainfall may average over 400 mm per month.

ECOLOGY. *Ectophylla alba* is known only from the Caribbean lowlands of Central America. It is one of only four species of phyllostomids endemic to Central America (Koopman, 1976). Elevations of localities where the species has been taken range from near sea level to over 730 m. Most accounts of habitat for Honduran white bats mention primary forest and the fact that the bats were netted in close proximity to *Heliconia* (Musaceae) stands. In Costa Rica, Timm and Mortimer (1976) found that *E. alba* was altering the shape of *Heliconia* leaves to produce a diurnal roosting structure, which they termed a "tent." To create a tent from a *Heliconia* leaf, *E. alba* severed the side veins and interconnecting tissue that extends at right angles from the midrib. The two sides of the leaf thus collapsed downward, hanging beneath the midrib. Veins and interconnected tissues were not completely severed and the sides of the leaf provided some support for the entire length of the cut. The uncut basal and terminal sections of the leaf contributed most of the structural support for the sides. The cuts did not extend either to the tip or to the base of a leaf. The side veins were cut at a distance of roughly 5 mm from the midrib, and each leaf had an area near the center of the tent where both sides were punctured with numerous small holes. In all cases where bats were observed in tents, they were hanging in the center of the punctured areas. Leaves that bats selected for tent construction hung approximately horizontal to the ground. Timm and Mortimer (1976) also noted that tents of *E. alba* were found in *Heliconia imbricata, H. latispatha, H. pogonantha, H. tortuosa,* and *H. sarapiquensis* (see Daniels and Stiles, 1979), and they provided measurements for 26 tents. More tents were found on *H. imbricata* and *H. tortuosa* than on the other three species, but those were also the most abundant species of *Heliconia* at La Selva. Bats appeared to be selecting a specific size-class of leaves for tent construction rather than leaves of a particular species of *Heliconia*. Fourteen individuals of *E. alba* were observed roosting under tents of cut *Heliconia* leaves during their study; bats were found in groups of six, four, and two, and two bats were hanging singly. The cluster of four bats contained two adult males and two adult females. Colonies were not restricted to roosting in a single tent over an extended period of time, but rather appeared to have a series of tents scattered throughout the forest for use as diurnal roosts. Foster and Timm (1976) and Timm and Mortimer (1976) postulated that tent construction by Neotropical phyllostomids evolved as a predation defense mechanism for roosting bats and perhaps also as a sun and rain shield. Timm and Mortimer (1976) observed that roosting bats readily took to flight when a tent leaf was jarred.

Ectophylla alba is frugivorous; identifications of specific fruits in the diet have not been made. No external or internal parasites have been reported for Honduran white bats.

The structure of the bat community at La Selva, Costa Rica, where most of the work on *E. alba* has been done, is quite complex. Presently, at least 58 species of Chiroptera have been reported from that single locality (LaVal, 1977; LaVal and Fitch, 1977).

GENETICS. *Ectophylla alba* has a diploid number of 30 and a fundamental number of 56. Greenbaum et al. (1975:156) stated that "The sex-determining system of *Ectophylla* appears to be the classical XX/XY. The X chromosome is a medium-sized submetacentric chromosome and the Y is a medium acrocentric chromosome with a secondary constriction near the distal end." The karyotype of *E. alba* is quite different from that of *Mesophylla macconnelli* and is one of the criteria used in distinguishing the two genera. Baker and Hsu (1970) reported that *M. macconnelli* had an XX/XO sex-chromosome system, with 2n = 21–22, FN = 22, and that all autosomes were acrocentric. Based on karyotypes, Greenbaum et al. (1975) postulated that *Mesophylla* and the *Vampyressa* complex constituted a lineage within the stenodermatines and that *Ectophylla* represented a distinct lineage. Greenbaum and Jones (1978) and Baker (1979) also reported a 2n of 30 and FN of 56, and brought the total number of *E. alba* karyotyped to date to three.

REMARKS. Allen described the Honduran white bat in 1892 on the basis of a single specimen lacking a skull, and in 1898 he described the skull and dentition from what was then the second known specimen. *E. alba* apparently was not detected again until Casebeer et al. (1963) reported three specimens captured at Finca La Selva, Heredia Province, Costa Rica.

The relationship of *E. alba* and the similar-looking stenodermatine, *Mesophylla macconnelli*, has been a matter of conjecture for some time. *M. macconnelli* was originally described by Thomas (1901) in a distinct genus, *Mesophylla*. Goodwin and Greenhall (1962) considered *Mesophylla* as a subgenus of *Ectophylla*, although they mentioned many cranial differences between *alba* and *macconnelli*. Starrett and Casebeer (1968:15), having the advantage of well-preserved specimens, reevaluated the generic status of *Ectophylla* and *Mesophylla*. They wrote: "The skull of *Vampyressa pusilla thyone* shows more similarity to that of *Mesophylla* than does the skull of *Ectophylla*, and exhibits dental features seen in both the other genera. *Ectophylla*, with its shortened rostrum, raised nasals, and exaggerated circular and flattened last lower molar (m2), appears to be the most highly modified of the three genera, and we see no justification for making it congeneric with *Mesophylla*." Utilizing karyology, Gardner (1977) and Greenbaum et al. (1975) also demonstrated that *M. macconnelli* was most similar to the *Vampyressa* complex, and suggested that both *E. alba* and *M. macconnelli* deserved generic recognition.

The generic name *Ectophylla* is of Greek derivation, a combination of the words *ektos*, meaning outside, and *phyllon*, meaning leaf and referring to the leaf nose. Allen (1892) recognized this genus partly because of its distinctive nose leaf. The specific name, *alba*, means white in Latin, and refers to the white coloration of the fur.

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