

## A NEW SPECIES OF STRIPE-FACED FRUIT BAT (CHIROPTERA: PTEROPODIDAE: *STYLOCTENIUM*) FROM THE PHILIPPINES

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For the past century, the genus *Styloctenium* Matschie has been known to contain a single species restricted to Sulawesi and the nearby Togian Islands. *Styloctenium* has a unique pelage, characterized by white supraocular spots and a white rostral stripe on an otherwise mostly orange pelage. Several additional features characterize the genus, including the loss of i1 and m3, rudimentary state of P1, and marked reduction of the molar cusps. The genus has often been considered closely allied to *Pteropus*, but no explicit, broadly supported, phylogenetic hypotheses have been proposed. Herein, I describe a new species of *Styloctenium* from Mindoro Island, Philippines, using a variety of dental, cranial, soft tissue, and external characters. The new species possesses all characters known to be diagnostic of *Styloctenium*, but also multicusped lower and upper canines. It is known only from the type locality in western Mindoro Island, is hunted (along with other large pteropodids), and may be at risk of extinction because of habitat loss, hunting, or both. The presence of a midsized, conspicuously colored, undescribed mammal on Mindoro emphasizes the need for further biodiversity inventories and specimen collection in the region, and on Mindoro in particular.

Key words: biodiversity, Megachiroptera, Mindoro, Pteropodini, Southeast Asia, *Styloctenium*, Sulawesi, taxonomy

In 1857, Alfred Russell Wallace collected a juvenile flying fox, on the island of Sulawesi (then Celebes), that possessed a unique pattern of facial markings. The specimen eventually made its way to the British Museum and was described as *Pteropus wallacei* by Gray (1866). In his description, Gray commented that although he had seen only a single juvenile, it was so unlike any other bat that the small sample and young age of the holotype did "... not in the least invalidate the distinctness of the species" (Gray 1866:65). The holotype lacks permanent dentition (Dobson 1878) and thus some disagreement over its proper designation ensued. Peters (1867) considered the type specimen a juvenile *Pteropus personatus*; Dobson (1878:40), however, with some reservations owing to the paucity of specimens, wrote "... as the peculiar markings of the fur of the face are very different from those of *Pt. personatus*, I think it better to consider *Pt. wallacei* a distinct species ... ."

In 1899, *Pteropus wallacei* was named as the type and sole member of a novel genus, *Styloctenium* Matschie, based on the

loss of i1, shape of I1 and I2, height of P3, and shape of the zygomatic arches noted in adult specimens collected after Gray's description (Matschie 1899). *Styloctenium* possesses several additional autapomorphies with respect to other pteropodines, such as the loss of m3, rudimentary state of P1, and marked reduction of molar cusps. Miller (1907:63) noted that *Styloctenium* is well differentiated from allies due to its "... peculiar dental formula and by the structure of the incisors and posterior cheek teeth." Subsequent authors (e.g., Andersen 1912; Corbett and Hill 1992; Simmons 2005) have followed Miller in recognizing the generic status of *Styloctenium*.

Recent phylogenetic analyses (e.g., Colgan and da Costa 2002; Colgan and Flannery 1995; Giannini and Simmons 2003, 2005) have made great improvements in our understanding of relationships among pteropodids, but *Styloctenium* and several other rarely collected taxa (e.g., *Harpyionycteris*, *Neopteryx*, and *Pteralopex*) often have not been included in these analyses, leaving our understanding of phylogenetic history, biogeography, and character evolution in the group in need of much additional study. Although no explicit and broadly supported phylogenetic hypotheses have included *Styloctenium*, the genus often has been considered a close ally of *Pteropus* (e.g., Andersen 1912; Miller 1907). Since its description more than a century ago, *Styloctenium* has been considered monotypic, and no specimens have been reported

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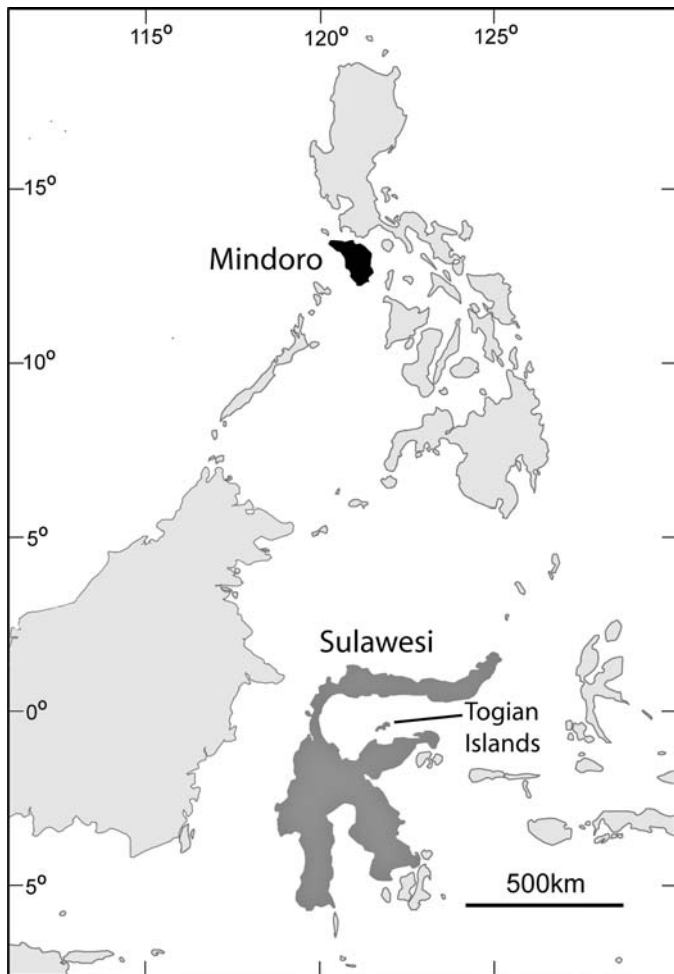


FIG. 1.—Map of insular Southeast Asia showing the distribution of the genus *Styloctenium*. *S. wallacei* is known only from Sulawesi and the Togian Islands (medium gray), Indonesia. *S. mindorensis*, new species, is known only from Mindoro Island (black), Philippines.

from beyond Sulawesi and the neighboring Togian Islands (Corbett and Hill 1992; Simmons 2005).

In February 2006, approximately 1,200 km north of the known distribution of *Styloctenium* (Fig. 1), I collected 4 specimens of a mid-sized pteropodid with distinctive facial markings and unusual teeth. Herein, I describe these specimens as representing a new species of *Styloctenium*. I use dental, cranial, external, and soft tissue characters to distinguish it from *S. wallacei* and other recognized members of Pteropodini (sensu Bergmans 1997).

## MATERIALS AND METHODS

Specimens of the new species were collected in mist nets at the interface between an open field with a few fruit trees and selectively logged lowland forest. Geographic coordinates at the collection locality were taken with a handheld global positioning system. Specimens were initially fixed in buffered 10% formalin and later transferred to 70% ethyl alcohol. Aliquots of liver were preserved in 95% ethyl alcohol and subsequently stored at  $-80^{\circ}\text{C}$ . Skulls were later removed and cleaned from

all 4 specimens. The soft palate of 1 specimen was photographed before the skull was cleaned.

Specimens examined are housed at the University of Kansas Natural History Museum and Biodiversity Research Center (KU), American Museum of Natural History (AMNH), Field Museum (FMNH), Smithsonian Institution (USNM), and the National Museum of the Philippines (NMP). All specimens examined are listed in Appendix I. The holotype of the new species will be transferred to the NMP.

Osteological nomenclature follows Giannini et al. (2006b). Color terminology follows Ridgway (1912) except where more generalized common nouns are used. Qualitative characters were compared to published descriptions of the following members of Pteropodini: *Acerodon*, *Mirimiri*, *Neopteryx*, *Pteralopex*, and *Pteropus* (Andersen 1912; Bergmans and Rozendaal 1988; Dobson 1878; Flannery 1995; Giannini and Simmons 2005; Gray 1866; Helgen 2005b; Hill and Beckon 1978; Koopman 1994; Matschie 1899; Miller 1907). Direct comparisons were made between specimens of the new species and *Styloctenium wallacei*, *Acerodon jubatus*, *A. leucotis*, *Pteralopex atrata*, *Pteropus dasymallus*, *P. hypomelanus*, *P. leucopterus*, and *P. pumilus*. These taxa were selected for comparisons because of close taxonomic relationships with *Styloctenium*, shared character states with the new species, because they occur at or near the type locality of the new species, or a combination of these factors (Andersen 1912; Bergmans and Rozendaal 1988; Heaney et al. 1998; Miller 1907).

Standard external measurements were taken to the nearest millimeter on freshly euthanized specimens of the new species; these included total length (TL), length of hind foot (HF), length of ear, length of forearm (FA), and mass (in grams). The following cranial and dental variables were measured to the nearest 0.1 mm with dial calipers: greatest length of skull (GLS), condylobasal length (CBL), zygomatic breadth (ZB), interorbital constriction (IOC: taken anterior to the postorbital process), postorbital constriction (POC: taken posterior to the postorbital process), mastoid breadth (MB), palatal length (PL: posterior margin of incisive fissure to anteriormost point on posterior margin of palate), length of maxillary toothrow (LMTR: at alveolus), breadth across upper molars (BUM: at alveolus), width of M1 (WM1: at crown), length of M1 (LM1: at alveolus), width of P4 (WP4: at crown), length of P4 (LP4: at alveolus), coronoid height (CH: greatest length from anterodorsal margin of coronoid to posteroventral margin of angular process), and coronoid breadth (CB: least distance from anterior margin of coronoid at junction with corpus to posterior margin of angular process). Variables not defined above are as in Martin et al. (2001).

## RESULTS

Specimens from Mindoro are distinguished from the pteropodine genera *Acerodon*, *Mirimiri*, *Neopteryx*, *Pteralopex*, and *Pteropus* by the number of lower incisors (1 versus 2 in all other genera), number of lower cheek teeth (5 versus 6 in all other genera), number of upper cheek teeth (5 versus 4 in *Neopteryx*), structure of the occlusal surfaces of the molars

**TABLE 1.**—Cranial, dental, and external measurements of *Styloctenium mindorensis*. Abbreviated variables are defined in the text. M = male; F = female.

Specimen	Sex	GLS	CBL	ZB	IOC	POC	MB	PL	LMTR	BUM	LM1	LP4	WM1	WP4	CH	CB	TL	HF	Ear	FA	Mass
KU 164521 (holotype)	F	53.6	51.5	28.9	6.9	5.8	16.7	26.0	20.5	15.0	4.1	3.7	3.8	3.8	22.8	17.9	180	36	24	114	212 <sup>a</sup>
KU 164520	M	53.4	50.7	28.7	7.2	6.1	17.7	25.5	20.6	14.9	4.4	3.8	3.5	3.7	22.4	16.6	153	31	23	106	168
KU 164522	M	51.2	49.0	28.1	7.3	6.7	16.8	24.3	20.0	14.3	4.0	3.5	3.4	3.6	21.6	16.4	159	31	23	106	152
KU 164523	M	50.9	49.8	28.9	6.3	5.9	16.9	24.3	19.5	13.7	3.6	3.1	3.2	3.7	19.9	15.9	148	31	22	101	149
$\bar{X}$		52.28	50.10	28.65	6.93	6.13	17.03	25.03	20.15	14.48	4.03	3.53	3.48	3.70	21.68	16.70	160.0	32.3	23.0	106.8	170.3
SD		1.42	0.88	0.38	0.45	0.40	0.46	0.86	0.51	0.60	0.33	0.31	0.25	0.08	1.28	0.85	14.1	2.5	0.8	5.4	29.1

<sup>a</sup> The holotype apparently carries an embryo and is thus substantially heavier than other individuals.

(rounded, broad surfaces versus relatively complex surfaces with elevated cusps in *Acerodon*, *Mirimiri*, *Pteralopex*, and *Pteropus*), relative size of the incisors (I1 and I2 subequal versus I2 substantially larger than I1 in *Mirimiri* and *Pteralopex*), prominence of the postorbital process (does not approach zygomatic arch versus approaches or attaches to zygomatic arch in *Mirimiri*, *Pteralopex*, and some *Pteropus*), and position of attachment of the wings to the body (attaches to sides of back versus attaches to, or very nearly to, midline of back in *Mirimiri*, *Neopteryx*, and *Pteralopex*; character 34 in Giannini and Simmons [2005]—Andersen 1912; Bergmans and Rozendaal 1988; Dobson 1878; Flannery 1995; Giannini and Simmons 2005; Helgen 2005b; Hill and Beckon 1978; Ingle and Heaney 1992; Koopman 1994; Matschie 1899; Miller 1907). Specimens from Mindoro are considered allied to *S. wallacei* based on the number of lower incisors (1) and lower cheek teeth (5), the rounded, broad occlusal surfaces of the molars, and externally, white supraocular spots (character 12 in Giannini and Simmons [2005]), white rostral stripe, white humeral spot (character 16 in Giannini and Simmons [2005]), and the conspicuously divided hair color between the anterior and posterior regions of the crown. The new specimens are therefore placed in the genus *Styloctenium*. However, it should be noted that the canines on specimens from Mindoro are far more complex than those of *S. wallacei* and share some character states with those found in *Pteralopex*, *Harpyionycteris*, and some *Nyctimene* (characters 62 and 63 in Giannini and Simmons [2005]).

Consideration of qualitative characters strongly supports the recognition of specimens from Mindoro as a new species. Sixteen diagnostic characters are described below to distinguish the new species from *S. wallacei*. External, cranial, and dental measurements for the new species are given in Table 1.

#### *Styloctenium mindorensis*, new species

**Holotype.**—Adult female (KU 164521; original field number J. A. Esselstyn 513; Figs. 2–4) collected 19 February 2006, originally fixed in formalin and subsequently stored in 70% ethyl alcohol. The skull has been removed and cleaned. At the time of collection, an aliquot of liver was removed and stored in 95% ethyl alcohol. The holotype apparently carries an embryo of approximately 30 mm crown–rump length, based on external palpation of the freshly euthanized animal. The holotype will be transferred to the NMP.

**Type locality.**—Mount Siburan, Barangay Batong Buhay, Sablayan Municipality, Occidental Mindoro Province, Mindoro Island, Philippines, at the edge of selectively logged lowland forest and an open field with a few guava trees (*Psidium* sp.), approximately 100 m above sea level (12°50.09'N, 120°55.81'E).

**Referred specimens.**—Three additional specimens were collected at the type locality between 18 and 23 February 2006. Each was preserved as a fluid specimen with the skull later removed and cleaned. Aliquots of liver were taken from each and preserved in 95% ethyl alcohol. KU 164520 is an adult male; the specimen is in good condition and the soft palate was photographed (Fig. 5) before the skull was cleaned. KU 164522 is an adult male. The right i2 is broken off where it would emerge from the mandible. Otherwise, the specimen is in good condition. KU 164523 is an adult male; the specimen is in good condition. All 3 males are slightly smaller than the holotype female in most external and cranial measurements.

**Distribution.**—The species is known only from the type locality, but probably occurs more broadly on Mindoro Island, perhaps in areas which retain lowland forest.

**Etymology.**—The specific epithet refers to Mindoro Island, the type locality and perhaps distributional limit of the species. I recommend “Mindoro stripe-faced fruit bat” as the English common name and further propose that *S. wallacei* be referred to as “Wallace’s stripe-faced fruit bat.”

**Diagnosis.**—*Styloctenium* has a dental formula of i 2/1, c 1/1, p 3/3, m 2/2, total 30. Regarding dental homologies, I follow Andersen (1912) and assume that the upper teeth represent I1, I2, C1, P1, P3, P4, M1, and M2 and the lower i2, c1, p1, p3, p4, m1, and m2.

*Styloctenium mindorensis* is distinguished from *S. wallacei* by the following characters, with alternate character states of *S. wallacei* in parentheses: (1) entire dentition except M2 larger absolutely and relative to skull (smaller absolutely and relative to skull; Fig. 2); (2) upper incisors form a nearly straight row (more arched); (3) upper canine with 2 prominent labial cusps, the anterior superior to the posterior, a subtle anterolingual cusp, and a well-developed posterolingual cingulum (canine not multicusped, but with vertical ridges and a poorly developed posterolingual cingulum that give the tooth a nearly quadrate shape in cross section; Figs. 2 and 3; characters 62–64 in Giannini and Simmons [2005]); (4) P3 with a prominent labial cusp connected by a ridge to a weakly elevated lingual

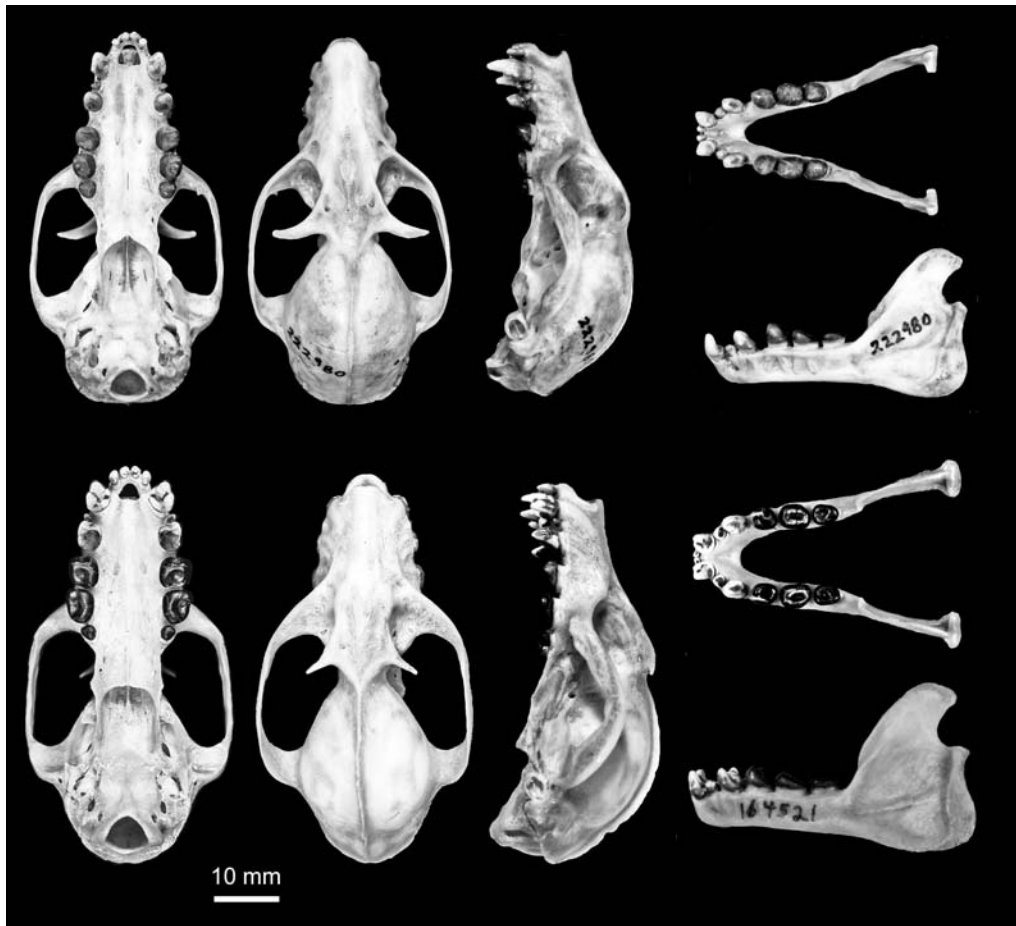


FIG. 2.—Photographs of the crania and mandibles of *Styloctenium wallacei* (AMNH 222980; upper) and the holotype of *S. mindorensis* (KU 164521; lower). From left to right: ventral, dorsal, and lateral views of the crania. Far right: dorsal (upper) and lateral (lower) views of the mandibles.

cusps (labial cusp connected to a ridge that descends lingually without terminating in a supplementary cusp); (5) lower incisors bifid (simple; character 41 in Giannini and Simmons [2005]); (6) lower canine bicuspid with the labial superior to the lingual (canine simple, not multicusped); (7) lower canine with a well-developed posterolingual cingulum (weakly developed posterolingual cingulum); (8) p3 with a moderately developed posterior basin (poorly developed posterior basin); (9) p3 with pronounced labial cusp connected by a ridge to an inferior,

lingual cusp that is poorly developed (no 2nd cusp); (10) p4 with a well-developed posterior basin (poorly developed posterior basin); (11) anteroposterior dimension of crown of m2 greater than labiolingual, but the latter reduced posteriorly giving the crown an oblong shape in cross section (the 2 dimensions subequal, giving the crown an approximately round shape in cross section); (12) rostrum broad (narrow); (13) post-dental palate ends in a slightly lyrate edge, exposing little of the sphenoidal crest (posterior margin of palate more deeply incised, exposing much of the sphenoidal crest); (14) postorbital process small with terminus lateroposteriorly oriented (postorbital process prominent with terminus lateroventrally oriented); (15) angular process of mandible extends beyond posterior margin of mandibular condyle (posterior margins of angular process and mandibular condyle subequally extended); (16) Mummy Brown patch of hair on throat (no dark patch on throat).

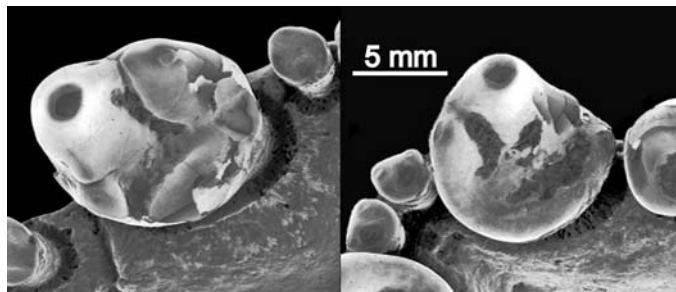


FIG. 3.—Scanning electron micrographs showing the upper (left) and lower (right) canines of the holotype of *Styloctenium mindorensis* (KU 164521).

*Description and comparisons.*—*Styloctenium mindorensis* is a small flying fox with distinctive facial markings (Fig. 4). The species is similar in general external appearance and size to *S. wallacei*, but differs markedly in several dental, cranial, and external characters.

Overall, the pelage of the new species is brighter than that seen in *S. wallacei*. The distal portions of the facial hairs are



FIG. 4.—Photograph of the holotype of *Styloctenium mindorensis* (KU 164521), taken shortly after its capture.

Zinc Orange to Ochraceous Orange except on the supraocular spots and rostral stripe, which are white. In *S. wallacei*, the facial pelage is closer to Ochraceous Buff; the white supraocular spots (character 12 in Giannini and Simmons [2005]) and white rostral stripe are similarly distinct, but they are enhanced by dark margins. The rostral stripe in *S. mindorensis* is shorter (about 5–8 mm) than in *S. wallacei* (about 11–15 mm). Both species have a white patch of hair at the angle of the mouth, but in *S. mindorensis* this is enhanced on the lower margin by Mummy Brown hair that extends to the throat, forming a large, dark patch. In *S. wallacei*, the white patch at the angle of the mouth is enhanced by a thin Mummy Brown margin, but this is not extended to form a throat patch. In both species, the hairs that make up the rostral stripe, supraocular spots, and patch at the angle of the mouth are uniformly white and lack the dark bases that characterize most other hairs of the head and body.

The ears of *S. mindorensis* are low with a round margin. They are pale overall, but more so at the base and darkened distally to form a brown margin. The ears of *S. wallacei* are uniformly light brown. In both species, the pelage of the crown is conspicuously divided between the orange hairs of the face and the pale hairs of the back of the head and suprascapular region (Fig. 4).

The dorsal pelage of *S. mindorensis* ranges from white to shades of orange distally, with a Mars Brown to Mummy Brown base. This region of pelage in *S. wallacei* is cream to Ochraceous Orange distally, with a Prout's Brown to black base. In the suprascapular area, both species have tribanded hair. In *S. mindorensis*, the dark basal band occupies approximately one-fourth the length of the hair; the middle band is white and occupies approximately three-fourths of the hair's length; and a minute distal band < 1 mm long is black; in *S. wallacei*, the basal band is black, the middle cream, and the distal black and long (approximately 1–3 mm). All 3 males of *S. mindorensis*, but not the female, possess a subtle dark stripe along the midline of the back; no dorsal stripe was noted on any specimens of *S. wallacei* (character 10 in Giannini and Simmons [2005]). Distally, hair of the lumbar region of

*S. mindorensis* is Pale-Ochraceous Buff to Ochraceous Buff, which then grades into Ochraceous Orange posteriorly to the feet. This region of pelage in *S. wallacei* is somewhat paler, ranging from light brown to Ochraceous Orange on the feet. These distal color bands occupy approximately one-half the length of the hair on the lower dorsum and grade to the distal three-fourths to the entire length of the hair on the legs in *S. mindorensis*, whereas in *S. wallacei* the distal band occupies only approximately one-fourth the length of the hair on the lower back and legs. Hair length on the lower dorsum is approximately 11–12 mm; some guard hairs approach 20 mm

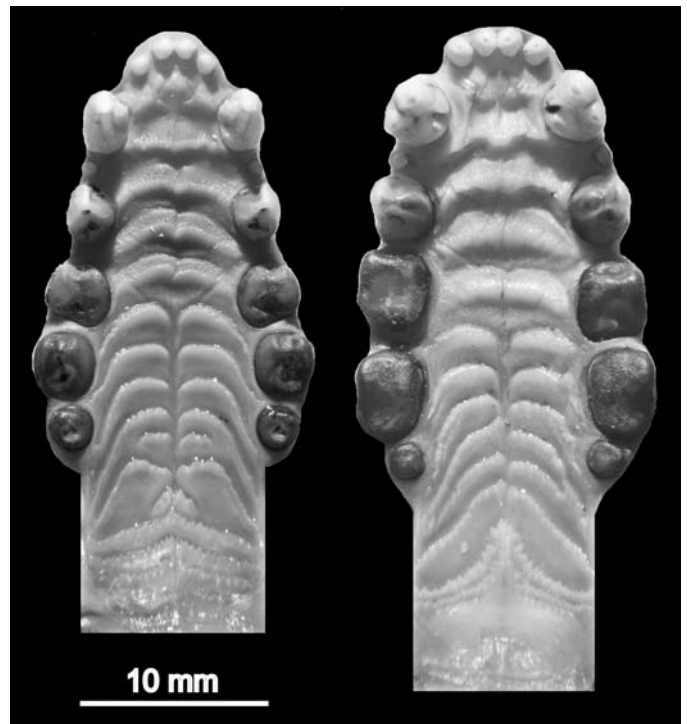


FIG. 5.—Photographs showing the soft palatal ridges in *Styloctenium wallacei* (AMNH 222982; left) and *S. mindorensis* (KU 164520; right).

in *S. mindorensis*. In *S. wallacei*, hair on the lower dorsum is approximately 7–12 mm long, with some guard hairs approaching 16 mm.

The distal portion of hairs on the venter of *S. mindorensis* range from Ochraceous Buff to Ochraceous Orange. In *S. wallacei*, the distal portions of these hairs are more variable in color, ranging from Light Buff to Ochraceous Orange. In both species, these colors are deepest along the midline of the venter, and paler along the flanks. In *S. mindorensis* and *S. wallacei*, the ventral hairs are Mummy Brown at their bases. The hairs possess 2 bands on the abdomen, but 3 on the upper chest in *S. mindorensis*, with the middle band white. In *S. wallacei*, hairs on the abdomen and chest have only 2 color bands. Hair on the throat is long in *S. mindorensis*, reaching about 17 mm in the dark throat patch, compared to only about 9–10 mm on the abdomen. In *S. wallacei*, hairs on the throat and abdomen are similar in length (about 9–11 mm) and color.

Dorsally, a white humeral spot (character 16 in Giannini and Simmons [2005]) is present in both *S. wallacei* and *S. mindorensis*. Both species also have moderately dense, adpressed white hair on approximately one-half the length of their forearm. This is fringed by sparse Pale-Ochraceous Orange to Ochraceous Orange hair on the plagiopatagium and propatagium adjacent to the forearm. The underside of the plagiopatagium and propatagium also have Ochraceous Orange hairs along the forearm. The wings of both species are mottled with a pattern of translucent spots and bands (character 33 in Giannini and Simmons [2005]). Translucent bands generally are parallel to the digits.

Cranially, *S. mindorensis* combines robust and gracile features. For example, the rostrum is broad and the teeth are large, but the postorbital processes are small relative to those of *S. wallacei* (character 99 in Giannini and Simmons [2005]), which has a more gracile rostrum and smaller teeth. In *S. mindorensis*, I1 and I2 both possess a lingual cingulum, with that on I2 being more prominent. The upper incisors in *S. wallacei* lack cingula. In both species, the cheek teeth, especially the molars and last premolar, are heavily pigmented reddish brown, whereas the incisors and canines seem to have a thinner pigmented layer that has partially worn off in all specimens examined. The rostral process of the malleus is long in *S. mindorensis* relative to the inconspicuous process seen in *S. wallacei*.

On the lower jaw, the coronoid process is more erect in *S. mindorensis* than in *S. wallacei*. The anterior edge of the coronoid process is slightly convex in *S. mindorensis*, but relatively straight in *S. wallacei*. The coronoid process is broader anteroposteriorly at the level of the condyle in *S. mindorensis* than in *S. wallacei*.

The following characterization of the soft palate is based on the examination of only KU 164520 and AMNH 222982 (Fig. 5): both specimens possess a precanine palatal ridge. In each specimen, the 7 most posterior ridges are denticulate; 7 and 8 anterior adenticulate ridges are present in KU 164520 and AMNH 222982, respectively. Two posterior palatal ridges in KU 164520 are biconcave with a distinct medial apex that is anteriorly oriented; these medial apices are much less

prominent in AMNH 222982. All of the denticulate ridges extend to the lateral margins of the palate in KU 164520, but the 4th and 6th most posterior ridges are much shorter in AMNH 222982, not extending to the lateral margins of the palate. The pattern of palatal ridges exhibited by KU 164520 is notably similar to that of *Pteralopex taki* presented in Parnaby (2002:151, figure 6a).

*Ecology*.—*Styloctenium mindorensis* is known only from the type locality, where it was collected at the interface between lowland forest and a large open field with a few guava trees (*Psidium* sp.). The species may be dependent on forest, as are many members of the Pteropodini.

## DISCUSSION

Consideration of external, osteological, and soft tissue characters certainly warrants recognition of the specimens from Mindoro as representing a new species. *S. mindorensis* shares numerous synapomorphies with *S. wallacei*, but also shows marked differences in the canines, soft palate, and some features of the integument. Some of these features perhaps suggest affinities with *Pteralopex*, *Neopteryx*, or both. Given these differences, perhaps the erection of a novel genus is warranted. However, in the absence of an explicit and robust phylogenetic hypothesis, and in the presence of several synapomorphies indicating a link to *S. wallacei*, I place the new species in the genus *Styloctenium*.

Recent authors have reconstructed phylogenetic relationships among pteropodine lineages (e.g., Colgan and da Costa 2002; Giannini and Simmons 2003, 2005), but unfortunately *S. wallacei* has not been included in these analyses. Although *S. mindorensis* is clearly more similar to *S. wallacei* than to any members of the *Mirimiri* + *Pteralopex* clade, it shares multicusped canines with this group. Canines with multiple cusps are now known to be present in 4 pteropodid lineages (*Harpyionycteris*, *Mirimiri* + *Pteralopex*, *Nyctimene*, and *S. mindorensis*—Corbett and Hill 1992; Flannery 1995; Giannini et al. 2006a; Giannini and Simmons 2005; Helgen 2005b; Koopman 1994). Peterson and Fenton (1970) and Giannini et al. (2006a) have suggested that robust, multicusped canines may facilitate penetration of the hard or fibrous outer layers of fruits such as pandans of the genera *Freycinetia* and *Pandanus*. However, several species that lack multicusped canines, such as *Pteropus mariannus*, *P. pselaphon*, and *P. tonganus*, also feed on these fruits (Wiles and Fujita 1992).

My guide on Mindoro, a life-long resident of the island, described the external features of *S. mindorensis* in great detail before we collected any specimens, and he stated that it is hunted for food. An assessment of the vulnerability of the species to hunting is difficult given a complete lack of data on the roosting habits or social structure of the species. However, some inferences may be possible based on sexual size dimorphism. Bergmans and Rozendaal (1988) wrote that female *S. wallacei* may be larger in average skull dimensions than males. The only female specimen of *S. mindorensis* is larger than all 3 males. If this apparent pattern of larger females holds for *S. mindorensis*, given statistically meaningful samples, this

would be unusual among the Pteropodini (Bergmans and Rozendaal 1988) and perhaps suggest an atypical mating system for the genus (i.e., not the polygynous pattern and attendant large colonies common in *Pteropus* [Pierson and Rainey 1992]). If *Styloctenium* roosts solitarily, or in small groups, it may be less vulnerable to hunting than species that aggregate in large colonies. This may also explain, in part, its late discovery on Mindoro. However, even if populations of *Styloctenium* are resistant to hunting, the species may nevertheless be dependent on lowland forest. Among Philippine islands, Mindoro has suffered from extensive deforestation (Environmental Science for Social Change 1999; Kummer 1992) and as a result, *S. mindorensis* may be seriously endangered. However, given a complete lack of data on geographic distribution, population size, and roosting and foraging ecology, making such a determination with confidence is difficult at best.

The discovery of a new, midsized, conspicuously colored species of mammal on Mindoro emphasizes the need for further assessments of biodiversity and conservation priorities on the island. Currently, 42 species of native terrestrial mammals are known from Mindoro, and 8 of these are endemic to the island (Heaney et al. 1998; this study). These figures will almost certainly increase as new collections are made. New species are being discovered in the Philippines and neighboring areas at a remarkable rate, and this pattern shows no sign of slowing (e.g., Balete et al. 2006, 2007; Heaney and Tabaranza 2006; Helgen 2005a, 2005b; Rickart et al. 1998, 2002, 2005). Mindoro has suffered extensive deforestation and several species endemic to the island are threatened with extinction (Heaney et al. 1998; Heaney and Regalado 1998; International Union for the Conservation of Nature 2002; Mittermeier et al. 1999; Wildlife Conservation Society of the Philippines 1997). Various, as yet undiscovered and undescribed species, also may be threatened with extinction.

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## APPENDIX I

### Specimens examined.

*Acerodon jubatus* (3).—Philippines, Negros Island, Negros Oriental Province, Amio, Pamo-At (FMNH 65463); Philippines, Manila (KU 2092, 2093).

*Acerodon leucotis* (1).—Philippines, Palawan Province, Busuanga Island, Busuanga, Singay (FMNH 63738).

*Pteralopex atrata* (1).—Solomon Islands, Isabel Island, Tunnibuli (FMNH 31561).

*Pteropus dasymallus* (2).—Philippines, Cagayan Province, Babuyan Islands, Babuyan Claro Island, Ayumit (NMP 5148); Japan, Ryukyu Islands, Yayeyama Group, Ishigake Island, Kabi, 800 m (FMNH 47264).

*Pteropus hypomelanus* (8).—Philippines, Palawan Province, Cuyo Island, Cuyo, Centro (FMNH 63745); Philippines, Cagayan Province, Babuyan Islands, Calayan Island, Calayan, Barangay Magsidel, Macarra, 19.294°N, 121.409°E, near sea level (KU 164094–164098); Calayan Island (KU 164099, 164100).

*Pteropus leucopterus* (3).—Philippines, Catanduanes Island, Catanduanes Province, Gigmoto, 1 km S, 600 m (FMNH 140635); Gigmoto, 1 km N, 8.5 km W, Buadan River, 200 m (USNM 574789); Philippines, Luzon Island, Cagayan Province, Baggao, Barrio Via, Sitio Hot Springs, 110 m (USNM 573263).

*Pteropus pumilus* (5).—Philippines, Negros Island, Negros Oriental Province, Mt. Talinis, 750 m (FMNH 142830); 1,250 m (FMNH 142831); Philippines, Mindoro Island, Occidental Mindoro Province, Sablayan Municipality, Mt. Siburan, Barangay Batong Buhay, 12°50.09'N, 120°55.81'E, approximately 100 m (KU 164501–164503).

*Styloctenium mindorensis* (4).—Philippines, Mindoro Island, Occidental Mindoro Province, Sablayan Municipality, Mt. Siburan, Barangay Batong Buhay, 12°50.09'N, 120°55.81'E, approximately 100 m (KU 164520–164523).

*Styloctenium wallacei* (8).—Indonesia, Togian Islands, Malenge (AMNH 153126, 153127); Indonesia, Sulawesi, Tomado (AMNH 196450, 222979–222982, 222985).