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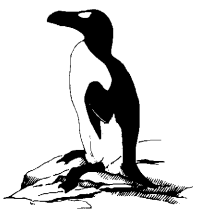

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EVIDENCE FOR A PREVIOUSLY UNRECOGNIZED SPECIES OF OWLET-NIGHTJAR

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ABSTRACT.—I studied the systematic relationships of the three large owlet-nightjars (Aegothelidae) to determine the taxonomic status of a fawn-colored lowland form currently classified as *Aegotheles insignis tatei*. I examined most of the existing specimens of *A. i. insignis* (n = 158) and *A. crinifrons* (n = 23) and all known specimens of *A. i. tatei* (n = 4). I also examined specimens of *A. albertisi* (n = 70), *A. archboldi* (n = 25), *A. bennettii* (n = 55), *A. cristatus* (n = 50), *A. savesi* (n = 1), and *A. wallacii* (n = 21). *Aegotheles i. tatei* was distinguishable from *A. i. insignis* and *A. crinifrons* by its small size and in seven plumage characters. *Aegotheles i. tatei* was further distinguishable from one or the other of these taxa by four additional characters. Unique among owlet-nightjars, *A. i. tatei* has the shortest tarsi, does not have recurved filamentous tips on its facial feathers, and has stiffer feathers on the auricular area and throat. My search of museums revealed two new specimens of *A. i. tatei*, expanding the known geographic range of this taxon 1,000 km eastward along the southern coast of Papua New Guinea from the upper Fly River to Nunumai, near the Ulamanu River. Unlike the montane *A. i. insignis*, *A. i. tatei* inhabits lowland forests where rivers emerge from foothills of the main cordillera. I propose that *tatei* be elevated to species status and that the name Starry Owlet-Nightjar be adopted based on the bird's markings. *Aegotheles crinifrons*, *A. insignis*, and *A. tatei* pass through a previously unrecognized but distinctive rufous juvenal plumage. These are the only owlet-nightjars known to exhibit this plumage, which calls for reexamination of generic limits within the Aegothelidae. *Received 13 October 1998, accepted 21 April 1999.*

OWLET-NIGHTJARS (Aegothelidae) are little-known nightbirds recognized by their cat-like faces, with eyes positioned forward and protected by a remarkable array of "whiskers." The family is currently restricted to the Australasian region, where 7 of 10 extant species inhabit the continental island of New Guinea. The origin and systematics of owlet-nightjars remain controversial despite recent study (Schodde and Mason 1980, 1997; Olson et al. 1987; Sibley and Alquist 1990; Mariaux and Braun 1996). Because the systematics of the Aegothelidae has not been investigated in depth (Rand and Gilliard 1968, Olson et al. 1987), misunderstandings persist regarding plumage characters and geographic variation, and species limits are in doubt.

Here, I examine the relationships and species status of three closely related taxa: the Feline Owlet-Nightjar (*Aegotheles i. insignis*) from montane New Guinea, the Moluccan Owlet-Nightjar (*A. crinifrons*) of Halmahera and Bacan islands, and *A. i. tatei* from the southern lowlands of New Guinea (cover, Fig. 1). All three differ from other owlet-nightjars in their relatively large size, extensive white or buff markings, and the previously overlooked but distinctive rufous juvenal plumage (this study;

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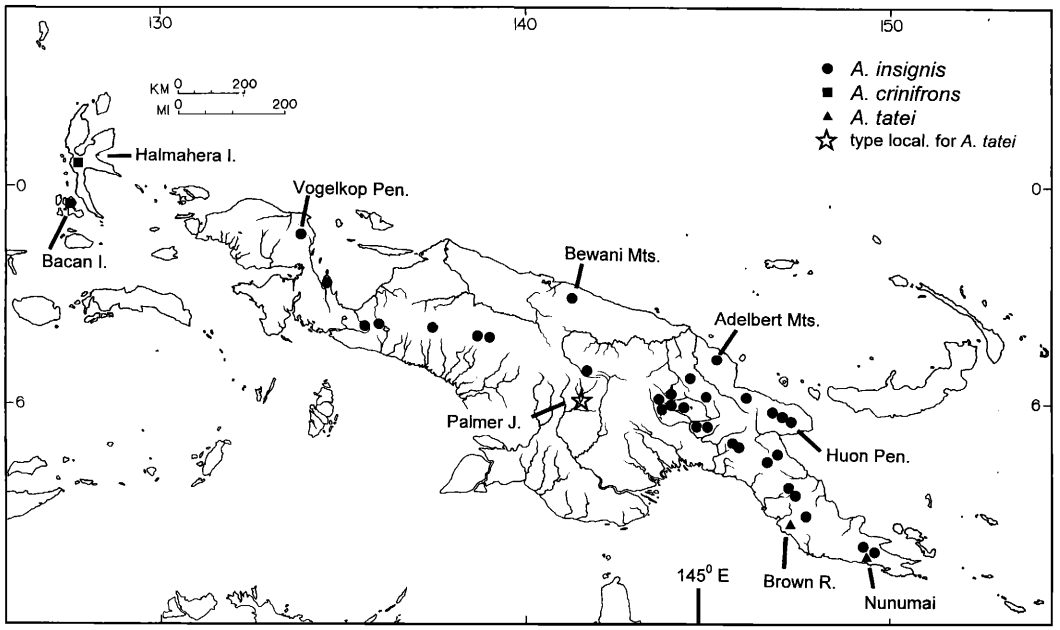

FIG. 1. New Guinea region with specimen localities for *Aegotheles insignis*, *A. crinifrons*, and *A. tatei*.

Schodde and Mason [1997:314] list other shared character states).

METHODS

Specimens examined.—Specimens of *Aegotheles albertisi* (n = 70), *A. archboldi* (n = 25), *A. bennettii* (n = 55), *A. cristatus* (n = 50), and *A. wallacii* (n = 21) were examined at the American Museum of Natural History (AMNH) and the Bernice P. Bishop Museum (BPBM) and were borrowed from other museums. R. Fleischer examined the sole specimen of *A. savesi*, and I studied photographs of it in Olson et al. (1987: 342–343). I studied and measured the majority of specimens of *A. i. insignis* (n = 158) and *A. crinifrons* (n = 23) held in museums worldwide (see Acknowledgments) and all known specimens of *A. i. tatei* (AMNH 426000 and 426001; Australian National Wildlife Collection [ANWC] 8394; United States National Museum of Natural History [USNM] 263713).

Overall color.—I scored mantle color, representing the plumage overall, using the Munsel color chart for plant tissues for *A. i. insignis* (n = 48) and *A. crinifrons* (n = 10) at AMNH and for all four specimens of *A. i. tatei*.

I also scored plumage as overall rufous, medium brown, dark brown, or medium brown with grayish breast, with or without obvious vermiculation, which is a character of the juvenal plumage. I did not consider barring or vermiculation on the wing and tail feathers, which are usually barred in all plumages. Vermiculation for *A. i. insignis* and *A. crinifrons* appeared as black or black-and-buff (sometimes white) thin wavy lines; for *A. i. tatei*, vermiculation was white with thin margins of dark rufous or occasionally black, yielding a frosted effect. For birds in first or second prebasic molt or first basic plumage, I recorded the location of retained nonvermiculated juvenal feathers. Contour plumage was recorded as molting from one plumage color to another or as not molting.

Molt.—Molt of remiges was recorded following Ginn and Melville (1983), and molt of rectrices was recorded as present or absent. Body molt was recorded as light (<5 feathers), heavy (≥5 feathers), or absent. Only birds in remigial molt or heavy body molt were classified as molting overall. Presence of natal down was recorded as persisting or not on the loral bristles, loral semibristles, crown, mantle, and rump. Plumage was classified on the basis of color and molt as juvenal, first basic, or definitive. Molt was classified on a similar basis as first prebasic, second prebasic, or definitive prebasic (Humphrey and Parkes 1959).

Plumage characters.—The superciliary tuft was (1) rounded, curved inward slightly, and folded into the crown feathers; or (2) pointed, sometimes curled inward and held semi-erect, but not folded into crown feathers. The tips of the rictal semibristles (Fig. 2) were (1) at least one-third or (2) less than one-third of semibristle length. Color of the underside of the wing was mostly (>80%) (1) dark brownish gray or (2) pale rufous. Undertail coverts were (1) white with or without dark tips, (2) rufous with two ranks of

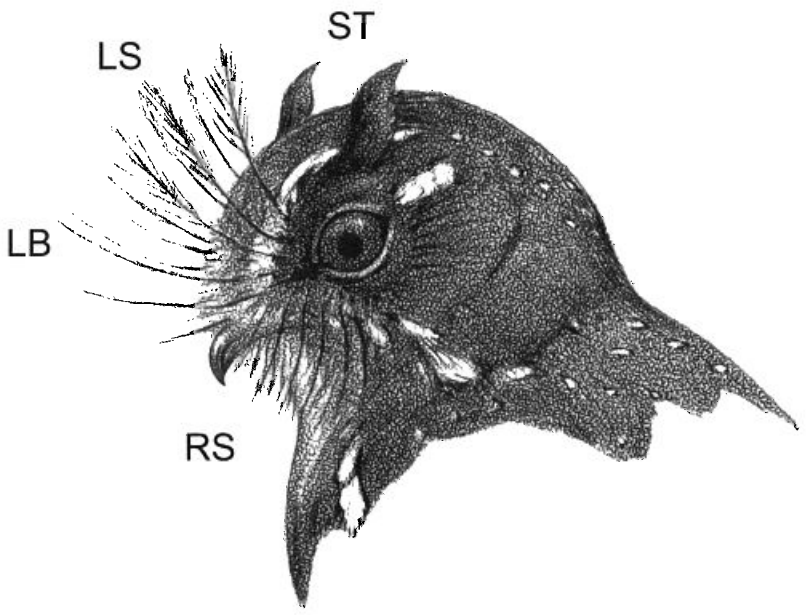

FIG. 2. Profile of *Aegotheles tatei* showing the pair of superciliary tufts (ST), three pairs of loral semibristles (LS), two pairs of loral bristles (LB), and rictal semibristles (RS). Drawing by James Coe.

white spots, (3) mostly rufous, or (4) brown with white bars or spots. Pale tail bars were (1) absent or pale rufous or (2) whitish (actually very pale rufous, approximately 2.5YR 8/4). Plumage characters that were not scored, because they were obvious or discovered later in the study, were instead checked opportunistically across series of specimens. These included presence of star-like spotting on the crown and back; plumage texture and length; color of the nares coverts; and presence of filamentous tips on the ear, chin, and throat feathers and the texture of these feathers.

Measurements.—Body mass was taken from specimen labels. Standard linear measurements were taken according to Baldwin et al. (1931), including length of flattened wing, wing tip, tail, and tarsus. "Gape" was the outside distance between the maxillar rami immediately distal to the head of the rami. "Undertail covert" was the length of coverts measured by inserting a ruler between the coverts and rectrices. "Loral semibristle" ("semibristle"; Fig. 2) was the length of the proximal-most loral semibristle as measured by inserting a ruler between that semibristle and the next anterior semibristle. "Loral bristle" ("bristle"; Fig. 2) was the length of the proximal-most bristle as measured by inserting a ruler between that bristle and next lateral bristle. "Ear covert" was the distance from the base of auricular coverts to their tips measured by inserting a flat ruler beneath the coverts. I measured only intact structures.

Analyses.—For *A. i. insignis* from the main cordillera of New Guinea, I tested separately the response variables (mass, wing, wing tip, tail, tarsus, gape, undertail covert, semibristle, bristle, and ear covert) for associations with four covariates (age, sex, elevation, and longitude). Two age classes were constructed: immature birds, and adults in definitive plumage. Elevation and longitude were continuous variables. Data were analyzed using analysis of covariance to test for significant interactions among the covariates (PROC GLM; SAS 1987). Initial models included interactions among all the covariates. However, because none of the interactions was significant, I ran the simpler model reported here that tested for age, sex, age × sex interaction, elevation, and longitude. *P*-values are reported for Type III sums of squares. Next, I compared populations of *A. i. insignis* and the three taxa (*A. i. insignis*, *A. crinifrons*, and *A. i. tatei*) using analysis of variance and Tukey's studentized range test (SAS 1987).

RESULTS

Plumage sequence.—Age-related variation in plumage coloration has been a major obstacle to identifying taxonomic characters among the large owlet-nightjars. Below, I present evidence for a distinct juvenal body plumage that previously has been regarded as an adult color morph for all three taxa (except by Gilliard and LeCroy 1961).

The plumage of all four fledglings of *Aego-*

theles i. insignis whose remiges were in sheath was rufous (2.5–5.0YR 4/6) and nonvermiculated. Traces of natal down were retained on the head and back of 25 birds with rufous nonvermiculated plumage (including all fledglings), but not on 130 specimens with this same plumage or with vermiculated plumage. Thirty-four specimens that were undergoing first or second prebasic molt or were in first basic plumage had been molting from nonvermiculated rufous plumage to vermiculated plumage of rufous, brown (4YR 3/6), dark brown (5YR 3/3), or brown with grayish breast. None of these was molting remiges, except for four birds in second prebasic molt in which old juvenal feathers were also retained in the wing coverts. These data indicate that the remiges are retained in first prebasic molt. I also noted in the juvenal plumage that the white terminal spots were larger, and the tips of these feathers were more raised, than in later plumages. A further 26 specimens of *A. i. insignis,* presumably in definitive plumage, were molting from rufous or brown vermiculated plumage to the same or darker plumage, and 20 of these were replacing remiges. Conversely, no specimens were molting from dark vermiculated to rufous nonvermiculated plumage. Only one bird (presumably an adult) that was replacing remiges was molting from rufous plumage with little vermiculation into the same plumage.

I detected no difference in plumage coloration of *A. i. insignis* with respect to sex and no differences in colors of the iris, bill, or legs and feet with respect to age or sex. However, iris color of specimens ($n = 92$) ranked by age may have darkened from light brown to medium brown (observers differed in their names for colors), matching the change in overall plumage coloration.

Aegotheles crinifrons undergoes a plumage sequence similar to that of *A. i. insignis,* based on evidence from fewer specimens. None of the 23 specimens examined was a fledgling. Two specimens in presumed juvenal plumage were rufous (2.5YR 4/6) without vermiculation, and one of these possessed traces of natal down. Six specimens of *A. crinifrons* had been molting from worn rufous nonvermiculated plumage to fresh vermiculated plumage, with an overall color of rufous or brownish gray (5.0YR 3.5/3.0). Three of these had mixes of juvenal and adult remiges. Four additional specimens had been molting from a vermiculated definitive plumage into a plumage identical to it. I detected no differences in plumage coloration with respect to sex or in perishable colors with respect to age and sex.

A diagnostic character state of *Aegotheles i. tatei* is the near absence of black vermiculation in adult plumage, resulting in the resemblance of postjuvenal *A. i. tatei* to juvenal plumages of all three taxa. Presumed postjuvenal plumage shows whitish vermiculation on the breast and belly (frosting; see Methods). Postjuvenal plumages also show star-like markings (i.e. white flecks edged with black) on the head and back, as do *A. i. insignis* of the same age class. Specimen AMNH 426001 lacked frosting and may be in early first prebasic molt. Three others with frosting, including USNM 263713 with primary molt, were probably in late first prebasic molt or later plumage. Assigning specimens of *A. i. tatei* to age class was difficult because of the presumed similarity between juvenal and adult plumages and because of the small number of specimens available for examination.

Comparison of plumage characters among taxa.— With plumage sequences defined, comparisons can now be made among the three taxa. *Aegotheles i. tatei* in juvenal plumage resembles juvenal *A. i. insignis* and *A. crinifrons,* and in definitive plumage resembles the rufous plumage of same-age *A. i. insignis. Aegotheles i. tatei* in brown definitive plumage should be looked for as the taxon becomes better known. Regardless of age class, *A. i. tatei* differs from both *A. i. insignis* and *A. crinifrons* by plumage characters 2 (vermiculation), 5 to 9 (feathers of the head), and 11 (undertail coverts) in Table 1. *Aegotheles i. tatei* shares with postjuvenal plumages of *A. i. insignis,* but not with *A. crinifrons,* the star spots on the crown and back (character 3). *Aegotheles i. tatei* and *A. crinifrons* differ from *A. i. insignis* in plumage texture (character 4). *Aegotheles i. tatei* shares with some rufous *A. crinifrons,* but not with *A. i. insignis,* the rufous ventral surface of the wing (character 10). The rectrices of *A. i. tatei* have whitish bars that are absent in juvenal *A. i. insignis* and *A. crinifrons* but present in some individuals of both species in brown definitive plumage (characters 12 and 13).

Morphometric analysis of Aegotheles i. insignis.—I characterized measurements of *A. i. in-*

TABLE 1. Plumage characters of *Aegotheles insignis*, *A. crinifrons*, and *A. tatei*.

Character	*A. insignis*	*A. crinifrons*	*A. tatei*
1. Adult color	Rufous to brown	Rufous to brown	Rufous
2. Vermiculation	Black and buff	Black and buff	Buff or white
3. Star spots	Yes	No	Yes
4. Plumage texture	Long, fluffy	Short, sleek	Short, sleek
5. Superciliary tufts	Long, folded, rounded	Short, folded, rounded	Long, curled, pointed
6. Nares coverts	White or white-rufous, dark at ridge	Buffy, dark at ridge	Rufous
7. Tips of rictal semibristles	$\geq$1/3 length	$\geq$1/3 length	$<$1/3 length
8. Ear coverts	Soft, long	Soft, short	Hispid, short
9. Tips to ear, chin, throat filamentous and recurved	Present	Present	Absent
10. Ventral wing color	Dark brownish-gray	Rufous to dark brownish-gray	Rufous
11. Undertail coverts	White w/dark tips, or brown w/white bars or spots	Buff w/dark bars	Rufous w/white spots
12. Tail bars whitish (adult)	Rarely	Yes	Yes
13. Tail bars whitish (juvenile)	No	No	Yes

signis for later comparison with *A. i. tatei*. I examined how measurements varied with age, sex, the interaction between age and sex, elevation, and distance across geographic range as measured by longitude. The analysis avoided variation associated with isolated populations (addressed later) by including only specimens from the main cordillera of New Guinea. Variables tested were body mass (n = 26), wing chord (n = 94), wing tip (n = 59), tail (n = 87), tarsus (n = 95), gape (n = 95), undertail covert (n = 42), semibristle (n = 56), bristle (n = 55), and ear covert (n = 57).

Variables associated with age were tail (F = 6.74, df = 5 and 81, P = 0.011), semibristle (F = 6.23, df = 5 and 50, P = 0.016), and bristle (F = 7.34, df = 5 and 49, P = 0.009), each of which was shorter for adult birds. Body mass was higher for adults (F = 4.53, df = 5 and 20, P = 0.046) than for juveniles. Variables associated with sex were tail, which was slightly longer in females (F = 4.36, df = 5 and 81, P = 0.040), and semibristle, which was longer in males (F = 10.66, df = 5 and 50, P = 0.002). Specimens that were sexed incorrectly may have obscured differences between sexes. Interactions between sex and age were not significant.

Five variables increased with longitude: body mass (F = 4.78, df = 5 and 20, P = 0.041), wing (F = 21.57, df = 5 and 88, $P < 0.0001$), tail (F = 18.19, d = 5 and 81, $P < 0.0001$), tarsus (F = 8.88, df = 5 and 89, P = 0.004), and gape (F = 7.88, df = 5 and 89, P = 0.0061). These variables all reflect an increase in overall size from west to east. The only variable associated with elevation was gape, which decreased with elevation (F = 8.72, df = 5 and 89, P = 0.004).

Next, I compared five populations of *A. i. insignis*: (1) "central" and (2) "eastern" populations from the main cordillera, divided at 145°E; (3) "Vogelkop" from the Vogelkop Peninsula; (4) "northern" from the Bewani and Adelbert mountains; and (5) "Huon" from the Huon Peninsula (Table 2). Variables compared were wing and tail for adult birds only. Mean wing length increased significantly in the following order: northern, central, and eastern birds (F = 11.81, df = 4 and 67, $P < 0.0001$). Mean tail length was significantly longer for eastern versus both central and northern birds (F = 5.58, df = 4 and 64, P = 0.0006). All other comparisons were not significant. The central, Huon, and Vogelkop birds represent the nom-

TABLE 2. Measurements by sex and age for five populations of *Aegotheles insignis* and for *A. crinifrons* (birds from Halmahera and Bacan islands pooled). Data are $\bar{x} \pm$ SD, with n in parentheses. Adult birds are in definitive plumage.

Sex/age class	Body mass (g)	Wing (mm)	Tail (mm)	Semibristle (mm)	Bristle (mm)
		***Aegotheles insignis* (Eastern)**			
Immature male	88.5 ± 12.3 (4)	170.0 ± 3.74 (14)	139.4 ± 5.81 (13)	36.6 ± 3.78 (7)	40.1 ± 2.61 (7)
Adult male	95.7 ± 6.81 (3)	170.0 ± 6.31 (16)	133.2 ± 4.08 (16)	33.7 ± 3.09 (7)	36.4 ± 2.88 (7)
Immature female	79.7 ± 3.79 (3)	171.3 ± 4.63 (17)	138.1 ± 5.12 (15)	34.0 ± 3.64 (9)	39.1 ± 1.90 (9)
Adult female	93.0 ± 6.39 (4)	171.1 ± 4.87 (18)	135.7 ± 2.95 (17)	29.6 ± 3.03 (10)	35.3 ± 3.50 (9)
		***Aegotheles insignis* (Central)**			
Immature male	71.4 ± 6.42 (4)	163.2 ± 5.99 (13)	130.0 ± 4.35 (12)	34.8 ± 2.91 (9)	36.7 ± 2.92 (9)
Adult male	78.6 ± 4.92 (4)	164.2 ± 4.90 (11)	130.6 ± 3.41 (10)	31.0 ± 2.45 (7)	33.0 ± 3.32 (7)
Immature female	77.3 ± 4.16 (3)	166.2 ± 6.34 (18)	135.2 ± 5.91 (16)	32.1 ± 3.48 (11)	37.2 ± 3.16 (11)
Adult female	74.5 ± 4.80 (4)	168.4 ± 5.06 (14)	132.2 ± 4.35 (14)	30.7 ± 2.18 (9)	35.6 ± 2.65 (9)
		***Aegotheles insignis* (Vogelkop)**			
Adult male	66.5 (1)	163 (1)	133 (1)	—	—
Immature female	70 (1)	162 (1)	130 (1)	30 (1)	39 (1)
Adult female	64 (1)	160 (1)	122 (1)	30 (1)	35 (1)
		***Aegotheles insignis* (Northern)**			
Adult male	63 (1)	150 (1)	120 (1)	23 (1)	31 (1)
Adult female	62.0 ± 4.58 (3)	156.0 ± 5.66 (2)	127.7 ± 4.04 (3)	27.5 ± 4.95 (2)	39.5 ± 0.71 (2)
		***Aegotheles insignis* (Huon)**			
Immature male	66 (1)	169.0 ± 5.66 (2)	134.5 ± 6.36 (2)	35 (1)	39 (1)
Adult male	90.5 (1)	160 (1)	—	—	—
Immature female	72.3 ± 4.62 (3)	164.0 ± 1.73 (3)	133 (1)	35.3 ± 0.58 (3)	37.3 ± 2.08 (3)
Adult female	81.5 ± 7.78 (2)	164.7 ± 5.69 (3)	129.7 ± 5.13 (3)	31.0 ± 1.41 (2)	34.0 ± 2.83 (2)
		Aegotheles crinifrons			
Immature male	—	160.5 ± 2.12 (2)	139.5 ± 9.19 (2)	22.5 ± 3.54 (2)	29.0 ± 2.83 (2)
Adult male	105 (1)	165.3 ± 5.70 (9)	139.6 ± 4.50 (9)	27.0 ± 1.32 (9)	29.6 ± 3.70 (8)
Immature female	—	167.3 ± 5.51 (3)	145.3 ± 3.51 (3)	26.0 (1)	37.0 (1)
Adult female	—	171.3 ± 4.04 (3)	144.3 ± 3.21 (3)	23.0 ± 1.41 (2)	28.0 ± 2.00 (3)

inate subspecies, whereas the larger eastern birds correspond with the obsolete taxon *pulcher*. The smaller northern birds have not been assigned to subspecies (see Pratt 1982, Diamond 1985).

Comparison of measurements among taxa.—Measurements for the three taxa revealed that body size increased in the order *A. i. tatei*, *A. i. insignis*, and *A. crinifrons* (Table 3). However, undertail covert and gape did not differ among taxa. Other differences relative to body size included (1) the tail was proportionately longer for both *A. i. tatei* and *A. crinifrons* than for *A. i. insignis*; (2) the tarsus was proportionately longer in the order *A. i. tatei*, *A. i. insignis*, and *A. crinifrons*; and (3) the semibristle, bristle, and ear covert were proportionately longer in the order *A. crinifrons*, *A. i. tatei*, and *A. i. insignis*. Although *A. i. insignis* from the Bewani and Adelbert ranges (i.e. northern) approached *A. i. tatei* in size (Tables 2 and 4), they resembled other *A. i. insignis* and differed from *A. i. tatei* in proportions and in all plumage characters.

Habitat and range.—Information on specimen labels (n = 115) showed that *A. i. insignis* inhabits montane forests from 1,140 to 2,800 m elevation, possibly as high as timberline. Whereas 35 birds of all ages were collected in primary and secondary forest, another 5 immature birds were taken from forest edge or fallow, a coffee plantation, or grassland. The range of *A. i. insignis* includes the main cordillera of New Guinea, plus many outlying ranges (Fig. 1). The insular *A. crinifrons* occupies a wider range of habitats, from coastal to montane primary forests, secondary forests, and plantations (Coates and Bishop 1997) at elevations from 15 to 1,800 m (n = 7).

A hiatus in elevation between 200 and 1,100 m separates the ranges of *A. i. tatei* and *A. i. insignis*. Thus far, *A. i. tatei* is known from primary forest at two southern lowland sites: the

TABLE 3. Measurements ($\bar{x}$, with range and n in parentheses; age and sex classes pooled) of *Aegotheles insignis* (from the main cordillera west of 145°E), *A. crinifrons*, and *A. tatei*. For each variable, means that are not significantly different (Tukey's studentized range test) contain the same superscript; all other comparisons are different at $P < 0.05$.

Variable	*A. insignis*	*A. crinifrons*	*A. tatei*
Body mass (g)	78.5 (58–101, 44)[A]	136.0 (105–167, 2)	52 (1)[A]
Wing (mm)	167.5 (150–180, 145)[A]	166.1 (158–177, 23)[A]	143.0 (136–148, 4)
Wing tip (mm)	43.5 (37–55, 92)[A]	42.0 (36–52, 22)[A]	32.0 (30–35, 4)
Tail (mm)	134.0 (120–149, 134)[A]	141.5 (130–149, 22)	126.5 (119–130, 4)[A]
Tail/wing	0.80 (0.74–0.86, 132)	0.85 (0.78–0.92, 22)[A]	0.88 (0.87–0.90, 4)[A]
Undertail coverts (mm)	35.8 (27–44, 59)[A]	38.4 (32–41, 7)[A]	38.2 (35–41, 4)[A]
Tarsus (mm)	23.0 (20–25, 146)	25.3 (24–27, 22)	17.3 (16–18, 4)
Tarsus/wing	0.14 (0.12–0.16, 142)	0.15 (0.14–0.17, 22)	0.12 (0.12–0.13, 4)
Gape (mm)	32.6 (24–39, 146)[A]	32.7 (28–37, 22)[A]	30.3 (29–31, 4)[A]
Semibristle (mm)	32.6 (23–41, 87)	25.9 (20–30, 20)[A]	24.7 (22–27, 4)[A]
Bristle (mm)	36.8 (29–43, 85)	30.1 (23–37, 20)[A]	29.3 (25–31, 4)[A]
Semibristle/bristle	0.89 (0.60–1.19, 84)[A]	0.86 (0.70–1.13, 19)[A]	0.85 (0.77–0.90, 4)[A]
Ear covert (mm)	32.3 (25–41, 86)	22.3 (19–25, 22)[A]	19.0 (16–21, 4)[A]

type locality 8 km below Palmer Junction on the Fly River (AMNH 426000 and 426001) and a new locality at Nunumai, north of Amazon Bay (ANWC 8394; Fig. 1). The Palmer Junction camp was situated along the large Fly River in hilly country south of the main cordillera (Rand and Brass 1940). Here, primary forest extended for many kilometers, and physiognomy indicated very high rainfall. Most bird specimens from this camp were taken by resident hunters who provided no locality information (Archbold and Rand 1940). The Nunumai bird was caught in a mist net in mature alluvial rainforest (R. Schodde pers. comm.). This site lies within the Ulamanu River drainage, a few kilometers from where the hills of the main cordillera begin to rise. The USNM specimen (263713) arrived at the museum in the 1920s but lacks locality and other data. The handwriting on the label does not match that of specimens collected by E. Weiske, H. Forbes, A. Goldie, and A. Meek, collectors who supplied specimens from southern New Guinea prior to 1920. Thus, the provenance of this specimen is unknown. The only other report of *A. i. tatei* is by R. Schodde (pers. comm.), who in July 1962 flushed one from the Hiritano Highway, about 2 km on the Port Moresby side of the Brown River bridge. The road was flanked by a pocket of tall alluvial rainforest that abutted the rising hills of the Brown-Laloki divide. These three localities share the same environment: riverine forest adjacent to hills flanking the main cordillera.

ELEVATION TO SPECIES STATUS

The taxon currently known as *Aegotheles insignis tatei* was described by Rand (1941:10). I propose that Rand's taxon be elevated to a full species:

Aegotheles tatei (Rand)
Starry Owlet-Nightjar

Holotype.—AMNH 426001, female, presumably early in first prebasic molt. Collected 2 June 1936 by A. L. Rand, 8 km (5 miles) below Palmer Junction, Fly River, Papua New Guinea.

Other specimens examined.—AMNH 426000, ANWC 8394, and USNM 263713 (Table 4).

Species description.—The holotype presumably is in juvenal plumage at the start of first prebasic molt. The other specimens are presumed to be in first or later basic plumages. These specimens differ from the holotype in being larger in all measurements except gape, in showing more white-and-black spots on the crown and back, in the whitish frosting on the back and breast, and in the more pronounced white-and-dark barring on the tail.

The plumage is rufous (2.5YR 4/6 to 4/8) throughout. White, black-edged, star-like spots, 1 to 2 mm in diameter, circle the back of the crown and are scattered on the back. Larger comma- or tear-shaped white spots highlight the scapulars and the pinched elevated tips of the wing coverts. The wings are faintly barred with buff bands edged with darker rufous. The tail is marked dorsally with eight whitish bars

TABLE 4. Measurements of *Aegotheles tatei* in mm. The assignment of specimens to age classes is tentative, because juvenal wing coverts were difficult to differentiate from definitive coverts. Only ANWC 8394 was weighed (52 g).

Specimen	Sex	Age	Wing	Wing tip	Tail	Tarsus	Under-tail covert	Gape	Semi-bristle	Bristle	Ear covert
AMNH 426001	F	Juvenile[a]	136	30	119	16.0	35	30	22	25	16
AMNH 426000	F	Adult	148	31	130	17.5	39	29	26	31	20
ANWC 8394	M	Juvenile[a]	144	35	128	18.0	38	31	27	30	19
USNM 263713	U	Adult[b]	144	32	129	17.6	41	31	24	31	21

[a] Bird undergoing first prebasic molt.
[b] Bird undergoing second prebasic molt.

with blackish edges proximally. The loral semibristles and bristles are blackish, and the rictal semibristles are rufous. A pair of rufous, pointed superciliary tufts curve inward and backward and stand out from the feathers of the crown; they are distinctly curled in AMNH 426000 and ANWC 8394. The face is marked with (1) a narrow superciliary streak of white feathers, starting behind the nares and extending to a point above the superciliary tufts; (2) a white "tear" tuft of three feathers, perhaps erectile, immediately behind the eye; (3) a white malar streak, also perhaps erectile, starting under each mandibular ramus at the corner of gape and extending behind the mouth and onto the throat; and (4) a broad, white central throat streak arising under the chin and leading onto the breast. The white feathers are variously accentuated, often asymmetrically, with dark rufous or black borders. The feathers of the nares are rufous, although the white superciliary streak continues forward over the lores and bill. The sides of breast are irregularly but heavily marked with white feathers, often bordered with black. The undertail coverts are rufous with two transverse ranks of white spots. The underwings show pale grayish-rufous primaries that become darker and less rufous proximally, and the underwing coverts are dull rufous with pale markings. The tail underneath is paler and more grayish than the dorsal surface, is darker toward the margins and tip, and is marked with whitish bands bordered with black. Soft-part colors, recorded only for ANWC 8394, were iris "tawny," mandible "dark purplish brown," maxilla "fleshy pink," and feet "flesh."

Measurements.—See Table 4.

Diagnosis.—*Aegotheles tatei* differs from all other owlet-nightjars in its facial feathering: (1) the superciliary tufts are conspicuously raised and pointed; (2) the rictal semibristles have short tips; and (3) the feathers of the ear, chin, and throat lack recurved filamentous tips and instead are hispid. Furthermore, the tarsus is the shortest of any owlet-nightjar (Olson et al. 1987, this study). *Aegotheles tatei* closely resembles juvenile *A. insignis* and *A. crinifrons* and the rufous adult *A. insignis*, sharing with these species the extensive white or buff markings and the distinctive rufous juvenal plumage. *Aegotheles tatei* differs from these two species in its small size, proportionately shorter wing tip, vermiculation of the definitive plumage expressed as whitish frosting without black barring, rufous nares coverts, and rufous undertail coverts with white spots. *Aegotheles tatei* further differs from the regionally sympatric *A. insignis* by plumage that is short and sleek rather than long and fluffy, by the undersides of the remiges that are rufous versus dark brownish-gray, and by habitat that is lowland versus montane forest.

Etymology.—Rand (1941) named the species for his colleague, mammalogist G. H. H. Tate. I propose the English name Starry Owlet-Nightjar for *Aegotheles tatei* to draw attention to the star-like spotting on the crown and back of the adults.

DISCUSSION

Salvadori (1875) based the description of *Aegotheles insignis* on a single specimen collected from the Vogelkop Peninsula. This specimen was described as rufous. The next specimen, presumably collected in the mountains inland from the Aroa River, southeastern New Guinea, became the type of *A. pulcher* (Hartert 1898). This specimen (AMNH 632114) is in juvenal

plumage with scant natal down on the rump. Hartert compared it with the type and then only specimen of *insignis*, which he found to differ in color and size. Later, Hartert doubted the utility of the taxon *A. pulcher* when he became aware of the great variability in plumage in a large series of *A. insignis* from southeastern New Guinea and in four specimens from the Vogelkop (Rothschild and Hartert 1907, Hartert 1930). Everyone who has compared the two taxa since has recommended synonymizing these forms, although recognizing that size increases from west to east (Rand 1942, Mayr and Gilliard 1954, Gyldenstolpe 1955, Diamond 1985).

My study established that the nonvermiculated rufous morph of *A. insignis* is actually the juvenal plumage and that the definitive plumage does not differ between the sexes. With these sources of variation accounted for, I failed to find plumage differences among populations of *A. insignis*. This leaves measurements as the only morphological criteria for distinguishing populations. Adults representing *pulcher* (i.e. eastern) averaged larger than other *A. insignis* by 23% in body mass and 2% in wing (mass, 94.1 vs. 76.6 g; wing, 170.6 vs. 166.1 mm, respectively; Table 2). Nevertheless, these differences were clinal and not diagnostic, and I recommend continuing to synonymize *pulcher* with *insignis*. By comparison, birds from the Bewani and Adelbert ranges (i.e. northern) averaged smaller than birds from the adjacent main cordillera, with a decrease of 19% and 8% in mass and wing, respectively, although measurements overlapped (mass, 62.3 vs. 76.6 g; wing, 153.3 vs. 166.1 mm; Table 2). The distribution of the Bewani and Adelbert populations is peculiar because it encompasses two widely separated mountain ranges. Because the populations from the Vogelkop, Wandamen, Bewani, and Adelbert mountains all require further collecting and study, it is premature to describe the Bewani and Adelbert populations as subspecies. The small size of Bewani and Adelbert *A. insignis* may result from character release in the absence of their smaller congener, *A. albertisi*.

Rand (1941) briefly described *A. tatei* as a subspecies of *A. insignis*, an arrangement accepted subsequently in nearly every reference to this taxon (Rand and Gilliard 1968, Greenway 1978, Beehler and Finch 1985, Monroe and Sibley 1993, Cleere and Nurney 1998). Exceptions included Gyldenstolpe (1955:67), who postulated that *A. tatei* was more closely related to *A. crinifrons*, although he gave no reason to support his opinion. In a paper on *A. savesi*, Olson et al. (1987) published scatter diagrams showing the shorter tarsus of *A. tatei* relative to other owlet-nightjars, and they noted the smaller size of *A. tatei* in comparison with *A. insignis*. They concluded that "this taxon probably deserves full specific rank."

Reasons why Rand did not recognize *A. tatei* as a species may be (1) his cursory examination, (2) his association of this owlet-nightjar with other montane species present in the lowlands along the Fly River (Rand and Brass 1940), (3) his belief that montane *A. insignis* increased in size with elevation (Rand 1936), and (4) his adherence to the then-current practice of lumping related allopatric taxa. It is perhaps revealing that on the same page where he described *tatei*, Rand (1941:10) named as subspecies two other birds now considered species: *Aegotheles archboldi* and *Collocalia papuensis* (Beehler and Finch 1985).

My study yielded numerous diagnosable characters that distinguish *A. tatei* from *A. insignis* and all other owlet-nightjars and supports classification of *tatei* as a species by the definitions of both the phylogenetic and biological species concepts (Cracraft 1983, Mayr and Ashlock 1991). These two taxa almost certainly would not (or do not) interbreed over the shared geographic range that they inhabit allotopically. That *A. tatei* is not a small, lowland subspecies of *A. insignis* is indicated by (1) a large set of unique character states for *A. tatei*; (2) an absence of clinal variation in plumage and measurements (except for gape) with elevation in *A. insignis*; and (3) a lack of regional variation in *A. insignis* (except for size) across its extensive geographic range. Although *A. insignis* and *A. tatei* look much alike, *A. tatei* possesses important unique character states: (1) the tarsus is extremely short; (2) the facial feathers lack recurved filamentous tips, and (3) the ear coverts and throat feathers are relatively stiff. These and many other character states distinguish *A. tatei* from *A. insignis* and show that the divergence between the two species is relatively great. By comparison, other pairs of closely related owlet-nightjars (e.g. *A. bennettii* vs. *A. wallacii*, *A. wallacii* vs. *A. albertisi*, and *A.*

albertisi vs. *A. archboldi*) differ by few characters, often only subtle variation in markings (Rand and Gilliard 1968, Beehler et al. 1986).

The rufous nonvermiculated juvenal plumage of *A. insignis, A. crinifrons,* and *A. tatei* is a striking feature compared with the barred, adult-like juvenal plumage of all other owlet-nightjars. Explanations for this distinct plumage should be sought in these birds' mysterious life histories. Three other features of juvenal *A. insignis*—the longer loral semibristles, longer loral bristles, and longer tail—may be associated with survival during the first weeks away from the nest. Historically, *A. insignis* (including *tatei*) and *A. crinifrons* have been raised to the level of genus (*Euaegotheles*; Mathews 1918) or subgenus (Schodde and Mason 1997) or have been classified with *Aegotheles* (Rand and Gilliard 1968, Olson et al. 1987). These relationships are currently under study.

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