

A new species of *Herpsilochmus* antwren from west of the Rio Madeira in Amazonian Brazil

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In 1988, MCH encountered a black-and-white *Herpsilochmus*³ in the canopy of *terra firme* forest in the Urucu basin, in the lower Juruá-Purus interfluvium of the Brazilian state of Amazonas. It appeared to be similar, vocally and visually, to *H. dorsimaculatus* (Spot-backed Antwren) of the Rio Negro basin, but that would have represented a very large and unexpected range extension. Without specimens and recordings, it was simply not possible to identify the species observed.

Throughout the following decade, as ornithological survey work intensified throughout the Brazilian Amazon, MCH and colleagues were intrigued by the apparent absence of any member of the genus *Herpsilochmus* from much of southern Amazonia, especially in the Madeira river basin. It seemed unlikely that the *terra firme* forest canopy flocks there would not be able to support one of these antwrens, prevalent in flocks in northern Amazonia and much of the rest of tropical South America; yet no other potentially competing species had been identified in what thus appeared to be a strangely unoccupied niche. We speculated regularly that it was simply a matter of time before a *Herpsilochmus* was found in this area and that it would most likely be a new species.

During bird collecting and survey work in the vicinity of Humaitá, Amazonas, in July 1999, MCH encountered *Herpsilochmus* antwrens in mixed-species canopy flocks on both sides of the Rio Madeira. Although very similar-looking to other white-bellied Amazonian species in the genus, they had distinctive vocalizations. Thanks to the availability of detailed vocal analyses of many species in this genus by Phyllis and Mort Isler, about to be published at the time (Whitney *et al.* 2000), it was possible to determine right away that both populations represented previously undescribed vocal types. Subsequent recording and collecting by us and our colleagues in numerous new localities, and DNA-based phylogenetic analyses of these and other *Herpsilochmus* by GAB, led to the confirmation that these were two distinct new species. The right-bank form, which we describe separately in this volume (Whitney *et al.* 2013), had been collected over a decade earlier by Douglas F. Stotz. The left-bank population turned out to be none other than the *Herpsilochmus* species that MCH had been unable to identify in 1988, which we name here as follows:

Herpsilochmus praedictus

Predicted Antwren

Chorozinho-esperado (Portuguese)



Holotype.— Instituto Nacional de Pesquisas da Amazônia (INPA) 264, adult female from Brazil: Amazonas; ca. 30 km W Humaitá (7°31'S/63°18'W); collected and prepared 20 July 1999 by Mario Cohn-Haft (MCH 535), with final preparation by Brian O'Shea. Voice (of at least one member of the collected pair, including also INPA 263) recorded by Mario Cohn-Haft (MCH1999.04A.12:45; Macaulay Library of Natural Sounds [ML] 169988). Pectoral muscle, heart, and liver tissues preserved in liquid nitrogen: LSUMZ B-25579. Hologenotype (Chakrabarty 2010) sequences of the mitochondrial gene NADH subunit 2 (ND2, 1041 bp) deposited in GenBank (accession number KC952967).

Diagnosis: Morphology.— As is typical in much of the genus *Herpsilochmus* (as diagnosed by Whitney and Álvarez 1998), morphometric and plumage differentiation is weak in males, which in this species tend to show slightly more black in the back than *H. stotzi* (Aripuana Antwren), the most closely related species (see *Phylogenetic relationships*, below). Females are somewhat more distinctive: female *H. praedictus* has a

more uniform and darker rusty forehead and lores than *H. stotzi* (whose lores are paler than its forehead; see also Whitney *et al.* 2013) and also has broader, longer, pale head streaks, which on *H. stotzi* are less than half the size and much more numerous, giving it a more finely speckled look (Fig. 1). **Voice.**— The loud-song (*sensu* Willis 1967) of males and females is a purring trill, similar to several other species, but readily distinguishable from all other currently recognized members of the genus, especially in spectrographic analysis, by its large number of notes and fast, slightly decelerating pace (described below in *Vocalizations*). **Genetic divergence.**— Separated from its sister-species *Herpsilochmus stotzi*, found only east of the Rio Madeira, by approximately 4% sequence divergence in the mitochondrial gene ND2 (see *Phylogenetic relationships*, below).

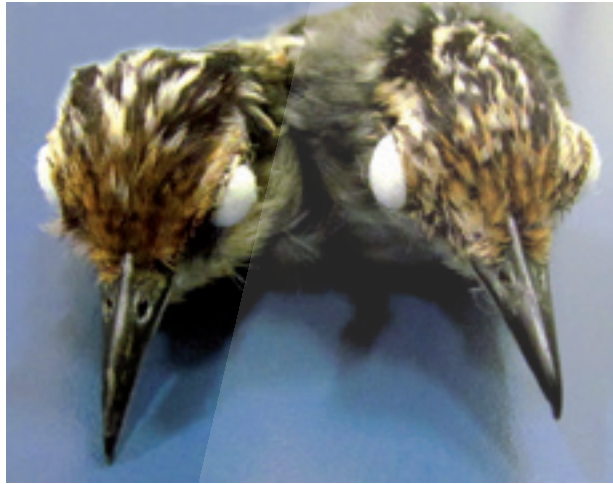
Distribution.— Currently known only from the Brazilian Amazonian state of Amazonas. The species' extent of occurrence (estimated distribution; Fig. 2) is delimited abruptly to the east and north by the Madeira and Amazon (Solimões) rivers, respectively; western and southern limits undetermined. On the

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Figure 1. Comparison of head patterns of female *H. praedictus* (INPA 2242, left) and *H. stotzi* (INPA 2230, right), showing the larger streaks and more uniform rusty forehead and lores of the former, versus the more speckled appearance and paler lores of the latter.



opposite banks of these rivers, other congeners (*H. stotzi* and *H. dorsimaculatus*, respectively) occur in similar habitats, apparently occupying the same niche. We and colleagues have observed the new species in dozens of localities between the middle and lower Purus and Madeira rivers. Outside this interfluvium, only two localities have been found to date west of the Purus, both reported by Whittaker, Aleixo, and Poletto (2008): one collected in the upper Urucu basin (see *Type Series*, below), probably near where MCH made the 1988 observation, and the other tape-recorded near the east bank of the middle Rio Juruá (5°26'S/67°17'W). This latter, in addition to two other sight records by MCH, near Boca do Acre (8°32'S/67°03'W) and Careiro do Castanho (ca. 3°48'S/60°18'W), indicate the most distant points, used to estimate the overall distribution. We tentatively treat the Rio Juruá as the western limit, but do not rule out the possibility of presence further west. The species appears to be much less common between the Juruá and Purus rivers than in the Madeira-Purus interfluvium (see *Ecology and Behavior*, below). Thus, it could easily have been overlooked further west, but also may be near the limit of its range in this area, and so cannot be assumed to occur more extensively than indicated on the map (Fig. 2).

Description of holotype.— See color illustration. Alphanumeric color designations determined through direct comparison with Munsell soil color charts (1994); colors in quotation marks are chart designations. Plumage fresh and unbraded, no wing, tail or body molt; trace fat; skull 100% ossified; ovary 5 × 3 mm, largest ovum 1.5 mm, 1 erupted follicle, oviduct 4 mm, convoluted; no bursa. Tiny feathers of forecrown “yellowish brown” (7.5YR 6/8) with black edgings, becoming fine shaft streaks on crown. Crown black with regular scattered, conspicuous whitish streaks or spots formed by white on the inner margin of most of crown feathers from above the eyes to the nape. Preocular/loral same color as forecrown with a small blackish preocular spot. Postocular stripe same black as crown and contrasting strongly with creamy whitish (10YR 8/4) superciliary and facial region. Broken white eyering. Sides of neck and entire upperparts medium-gray with ochraceous wash (2.5YR 5/2). Concealed white interscapular patch present; tips black on those feathers. Throat and breast pale creamy-white, infused with ochraceous wash on malar and across breast (2.5Y 8.5/4); sides of breast, flanks, and thighs mixed slightly grayish; lower belly and undertail coverts slightly paler than throat. Tail distinctly graduated, outer rectrices about 18 mm shorter than central pair. Outermost pair of rectrices white with very restricted blackish bases on proximal vanes. White tips on successive pairs decreasing from outermost to innermost, central rectrices with no spots at tips, but with distinct whitish edges most conspicuous on proximal margin. Wing coverts same black as crown, each feather marked with a conspicuous white tip mostly restricted to distal vane of the median and greater coverts. Light tips on tiny feathers at bend of wing and on lesser wing coverts appear as scattered spots, but arrangement of light tips on median and greater coverts more regular, imparting two well-defined, white wing-bars. Scapulars blackish with a contrasting white margin on distal vanes, forming a conspicuous white stripe overlying proximal ends of wing bars. Bend of wing white, primary coverts blackish. Alula black with contrasting whitish margin on distal vane reaching tip. Remiges blackish-brown with narrow but conspicuous whitish fringes on the outer 2/3 portion of distal vanes, and similar fringes on entire proximal vanes; on closed wing forming a black bar below greater coverts. Underwing coverts whitish with very pale yellow wash. **Soft parts in life:** iris

dark brown, maxilla black, mandible pale gray; toes and tarsi slate gray. **Standard measurements:** (taken from prepared specimen): bill length from anterior edge of nares 10.0 mm; bill width at anterior edge of nares 4.7 mm; bill depth at anterior edge of nares 3.9 mm; wing (chord) 49.9 mm; primary 10 (chord) 34.1 mm; secondary 1 (chord) 46.7 mm; tail length 46.3 mm; tarsus 18.2 mm; hallux 10.8 mm; mass (fresh) 11.2 g.

Etymology.— The scientific and common names refer to the fact that the existence of this species was predicted before it was actually found and recognized (see above).

REMARKS

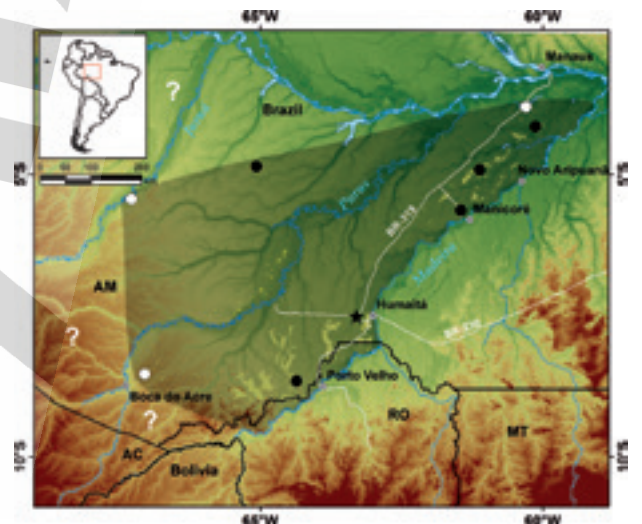
Type series.— The allotype of *Herpsilochmus praedictus* is INPA 263, adult male, collected together with the holotype. The remaining paratypes of *H. praedictus* are the following seven specimens, all from the Brazilian state of Amazonas (AM): INPA 2126 male (AM, left bank Rio Madeira, km 18 AM-464, ca. 25 km NW Manicoré at “igarapé Santa Maria”, 5°38'S/61°27'W); 2237 male, 2240 male (AM, ca. 120 km S Manaus at “Campo do Tupana”, 4°09'S/60°08'W); 2241 male, 2242 female (AM, ca. 240 km S Manaus at “Campo da Catuquirá”, 4°55'S/61°07'W); 2243 male (AM, ca. 50 km W Porto Velho at “Campo do Ramal do Mucumim,” km 37, 8°40'S/64°22'W); Museu Paraense Emílio Goeldi (MPEG) 61157 male (AM, municipality Coari, Base Petrobras Urucu at “Papagaio”, 4°51'18.5”S/65°04'15.7”W). There is no noteworthy variation in this series among individuals of the same sex.

Ecology and behavior.— As in other members of the genus *Herpsilochmus*, *H. praedictus* is usually found in pairs in the forest canopy, often accompanying mixed-species flocks of canopy insectivores. They forage for insects while moving deliberately through the highest foliage near the tips of the tree crowns at whatever height the forest canopy may attain, ranging from 5 to over 30 meters above ground. Although there have been no detailed diet analyses of the species, stomach contents of all collected individuals were noted as including arthropod parts.

The species occurs in low-stature forest on sandy soils (*campinarana*) near the edge of natural savannas (*campinas*), in tall *terra firme* (upland) forest on weathered clay soils, and in *igapó* seasonally flooded forest along small, blackwater rivers, such as that found extensively along the Igarapé-açu and Tupana rivers. This *igapó* forest is structurally similar to *campinarana*, having a fairly dense, low (5-10 m) canopy, with some unusual plant species in common, such as trees in the genera *Qualea* or *Ruitzerania* (Vochysiaceae) and *Aldina* (Fabaceae), and the peculiar grasslike ferns of the genus *Actinostachys* (Schizaceae) (see Cohn-Haft *et al.* 2007). The antwren enters tall second-growth adjacent to primary forest, but is absent from *várzea* forests of floodplains along the muddy-water Madeira, Purus and Juruá rivers.

The presence of *campinas* seems to be a useful indicator of regions where the species occurs, despite the bird being nota-

Figure 2. Estimated distribution (shaded area) of *Herpsilochmus praedictus* in Amazonian Brazil, showing the type locality (black star), localities of the other collected specimens (black circles), and the sight/sound records mentioned in the text (white dots). The range is sharply bounded by the Amazon and Madeira rivers to the north and east, but less surely defined to the northwest and southwest, where question marks indicate possible presence, as yet undocumented. The natural savannas (*campinas*) associated indirectly with the species' presence (see text) are shown as pale regions within the shaded area. Black lines mark boundaries of Brazilian states, names abbreviated: AM (Amazonas), AC (Acre), RO (Rondônia), MT (Mato Grosso), and highways are shown in white.



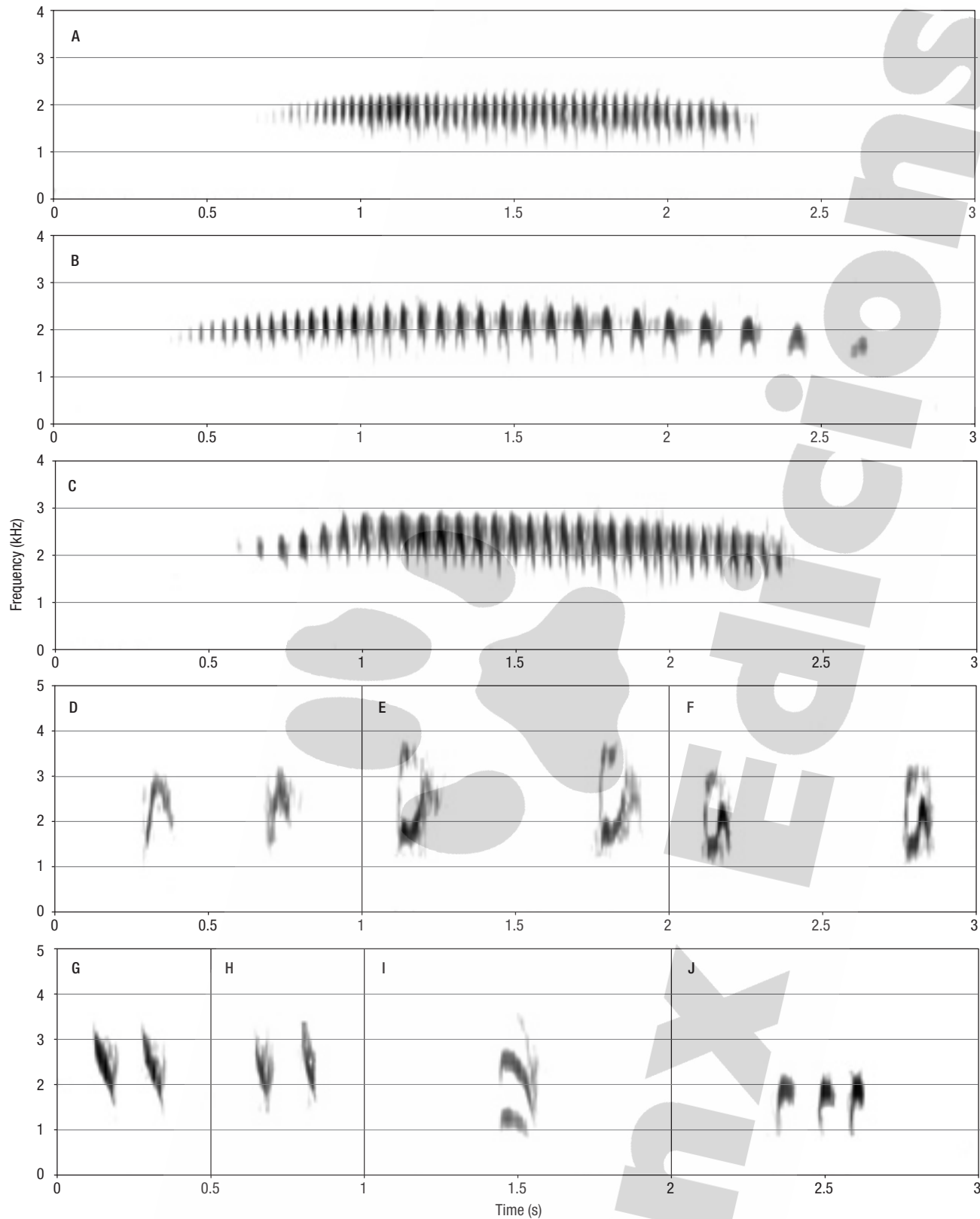


Figure 3. Vocalizations of three similar Amazonian *Herpsilochmus* species for comparison (see text). Loudsong of (A) *H. praedictus*, (B) *H. stotzi* (MT, left bank Rio Roosevelt; 6 August 2011; Whitney recording BMW-14046, MZUSP 92292), and (C) *H. dorsimaculatus*. Calls, including (D) dull “pwip” of *H. praedictus*, (E) “tchwee” of *H. stotzi* (AM, along highway BR-230 [“Transamazônica”] east of Humaitá; 8 December 2011; Whitney recording BMW-14806, MZUSP 92433), and (F) “twee” of *H. dorsimaculatus*. Sharp “chew” calls of (G) *H. praedictus* and (H) *H. stotzi* (AM, along highway BR-230 [“Transamazônica”] east of Humaitá; 8 December 2011; Whitney recording BMW-14806, MZUSP 92433). Other calls of *H. dorsimaculatus*: (I) “bup” and (J) “bibip”. All vocalizations depicted of *H. praedictus* are from AM, at “Campo do Ramal do Mucuí,” west of Porto Velho by Cohn-Haft (MCH2007.18B.ca10 and MCH2007.14B.ca25); those of *H. dorsimaculatus* are from AM, Manaus by L. N. Naka (ASA 250 and LNN 2000-01).

bly absent from the savannas themselves. Where *campina* and *campinarana* are rare, such as in the Purus-Juruá interfluvium, the species appears to be rarer in the *terra firme*, suggesting that its preferred habitat is in fact *campinarana* forest and that typical, tall *terra firme* may represent a population sink, receiving the “overflow” from *campinarana*. Alternatively, the species may select specific types of *terra firme* forest as yet to be recognized or distinguished in existing habitat classifications. The presence of the palm species *Lepidocaryum tenue* (Portuguese *caranaí*) and *Oenocarpus bataua* (Portuguese *patauí*) appears to be a useful indicator of *terra firme* forests appropriate for this antwren. This kind of imperfect association with *campinarana* is also found in several other Amazonian *Herpsilochmus*, including *H. dorsi-*

maculatus and *H. stotzi*, and may explain the species’ seemingly vague western and southern distributional limits in the absence of obvious dispersal barriers or competing species.

Vocalizations.— Songs and calls of *H. praedictus* are similar to those of other species (see also Whitney *et al.* 2000), but entirely diagnosable. Songs are softly purring, rolling trills, of roughly 1.5–2 s duration, rising in frequency from approximately 1.5 kHz to between 2.2 and 2.4 kHz, before falling back at the end to something very close to the starting frequency (Fig. 3A). Both males and females sing, usually alternating, but not perfectly synchronized. It is possible to hear subtle differences in peak frequency between members of a pair, although whether

those differences are consistently associated with the respective sexes has not been determined. The songs are most like those of *H. stotzi* (Fig. 3B) and *H. dorsimaculatus* (Fig. 3C); all three consist of series of notes shaped like inverted “V”s, but differ consistently and diagnostically in pace and the number of notes. The fastest song is that of *H. praedictus*, with some 48–60 notes over a nearly 2-s duration. The song decelerates slightly toward the end, with the interval between notes increasing from 0.03s to 0.05s. Both *H. stotzi* and *H. dorsimaculatus* have only about half as many notes per song (27–34) over a similar duration. The two species thus have slower (and slightly higher-pitched) songs than *H. praedictus*, but these also differ strikingly in pace from one another: *H. stotzi* song decelerates dramatically throughout (internote intervals increase from 0.4 to 0.13s from song beginning to end), whereas the song of *H. dorsimaculatus* accelerates (internote intervals drop from 0.08 to 0.04s).

The new species also has at least two distinctive call types. One is a dull “pwip” (Fig. 3D), similar to what appear to be analogous calls of the other two species. In all three, this call is about 0.1s in duration, with a conspicuous harmonic at the start, but has a diagnostic shape and sound for each species. The note in *H. praedictus* is shaped roughly like an inverted “U”, with a hint of an inflection near the start at about 1.7 kHz. In *H. stotzi*, the note has a conspicuous double inflection near the start before continuing to rise sharply (Fig. 3E); it sounds like a nearly two-syllable “tchwee”. The equivalent call in *H. dorsimaculatus* is not common. It is comprised of a note intermediate in shape, with a long inflection at about 1.4 kHz (Fig. 3F); thus it is the lowest-pitched of the three and sounds like “twee”. The most frequent call given by *H. praedictus* is a short (0.05–0.08s duration), sharp “chew” (Fig. 3G), given singly, in groups of 2–3 notes repeated, or occasionally in a longer series. It is virtually identical to the equivalent call of *H. stotzi* (Fig. 3H) and may represent a synapomorphy for their clade (see *Phylogenetic relationships*, below). Each note has a distinctive shape, descending sharply from about 3 to 1 kHz, with the most intense (loudest) part between roughly 2.0 and 2.8 kHz. On the other hand, the most common call in *H. dorsimaculatus* is quite different: a simple “bup” (Fig. 3I); it also occasionally delivers a soft, 3-note “bibibip” (Fig. 3J).

Phylogenetic relationships.— DNA sequence data for the mitochondrial gene NADH subunit 2 (ND2, 1041 bp) were obtained for 33 individuals of nine species in the genus *Herpsilochmus*

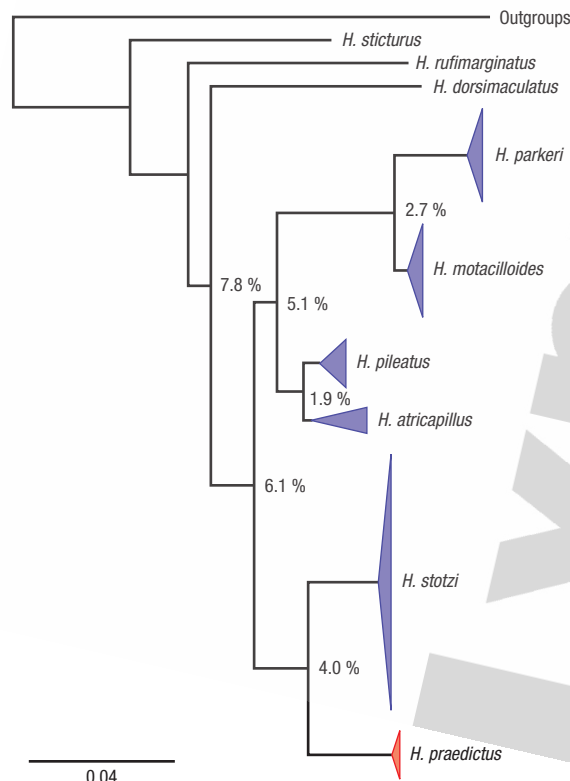


Figure 4. Maximum-likelihood tree topology of the genus *Herpsilochmus* showing that *H. praedictus* is sister to *H. stotzi* (from east of the Rio Madeira, described in this volume by Whitney et al.) and that this pair is sister to the well-resolved *H. pileatus* complex. All other currently recognized *Herpsilochmus* spp. are outside the clade shown (Bravo and Brumfield, unpubl. data). All resolved nodes have bootstrap support values based on 1000 replicates >70 and posterior probability values >0.95.

(Fig. 4), including all those pertaining to the same clade within the genus (according to a previous analysis of all *Thamnophilidae* [Bravo and Brumfield, unpubl. data; see Supplementary Information (SI) at the Internet Bird Collection (IBC) website (<http://ibc.lynxeds.com>) for a list of ingroup and outgroup taxa]). Phylogenies by maximum-likelihood and Bayesian inference methods (see details in SI) showed, with high support, that *H. praedictus* is sister to *H. stotzi*, forming a clade that is distributed on both sides of the Rio Madeira. This pair of species is sister to the clade formed by *H. pileatus*, *H. atricapillus*, *H. parkeri*, and *H. motacilloides*, all members of the *H. pileatus* complex (*sensu* Whitney et al. 2000).

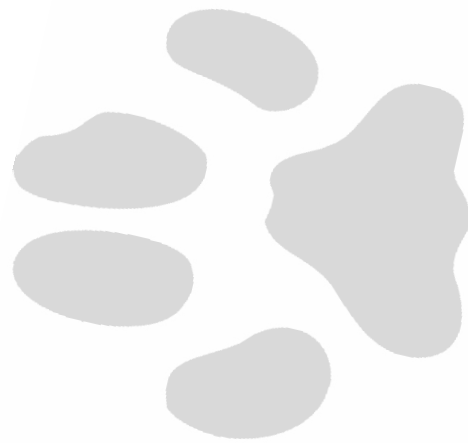
Conservation.— This species is not currently under serious threat of extinction. It is more common and has a larger distribution and wider habitat tolerance than the ecologically similar Campina Jay (*Cyanocorax hafferi*), which is treated as “vulnerable” (Cohn-Haft et al. 2013). Although the western part of the antwren’s distribution is very remote and largely intact, the species’ stronghold appears to be in the Madeira-Purus interfluvium where development projects and predicted deforestation may be held at bay by recently created but as yet unimplemented parks and reserves. Thus, the relatively restricted distribution and potential for future habitat disturbance are cause for concern and vigilance.

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