

A new species of *Herpsilochmus* antwren from the Aripuanã-Machado interfluvium in central Amazonian Brazil

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In June and November, 1986, Douglas F. Stotz and colleagues secured six specimens of a *Herpsilochmus*⁴ antwren in *campinarana* forest (“low forest”) on the remote east side (right bank) of the Rio Machado (or Ji-Paraná) in Rondônia, Brazil. The series was thought to represent a previously unknown population of *H. atricapillus* (Black-capped Antwren) about 550 km disjunct from its nearest known area of occurrence in western Mato Grosso (Stotz *et al.* 1997). In a biogeographic study of the *H. pileatus* (Bahia Antwren) complex, BMW examined part of the Rondônia series and Whitney *et al.* (2000) suggested that it was specifically distinct from *H. atricapillus*. Further analysis of plumages, vocalizations, and mitochondrial DNA, together with establishment of this antwren’s geographic distribution, convinces us that it is best described as a new species, which we propose to name:

Herpsilochmus stotzi

Aripuana Antwren

Chorozinho-do-aripuanã (Portuguese)



Holotype.— Instituto Nacional de Pesquisas da Amazônia (INPA) 2230, subadult female from Brazil: Amazonas; left bank of the Rio Aripuanã in the municipality of Manicoré (5°25’S/60°42’W) about 80 km southeast of Manicoré at “comunidade Itapinima”; collected and prepared 23 September 2004 by Mario Cohn-Haft, final preparation by Ingrid Macedo. Voice recorded by Mario Cohn-Haft, original recording deposited at Macaulay Library of Natural Sounds (ML) 169989. Pectoral muscle, heart, and liver tissue preserved in liquid nitrogen in the field, currently in ultracold INPA freezers: INPA A-302, field number MCH 628. Hologenotype (Chakrabarty 2010) sequences of the mitochondrial gene NDH subunit 2 (ND2, 1041 bp) deposited in GenBank (accession number KC952965).

Diagnosis: Morphology.— A typical member of *Herpsilochmus* as the genus was diagnosed by Whitney and Álvarez (1998). Adult females readily distinguished from those of other taxa in the *H. pileatus* complex by paler, creamy-white throat contrasting more sharply with the orangish forecrown, and more extensively (and typically more purely) white posterior underparts; from a single adult female of *H. praedictus* (Predicted Antwren, west of the Rio Madeira described in this volume by Cohn-Haft and Bravo [2013]) by less densely orangish, more streaked or dappled, frontal region. Males of the new species appear to be indistinguishable from “white morph” and “intermediate” (Whitney *et al.* 2000) males of *H. atricapillus* including the pattern of black and white on the rectrices; may be distinguishable from *H. praedictus* by plainer gray mantle/back, these areas appearing more extensively black in the small sample of specimens of that form. **Voice.**— Loudsong of both sexes immediately distinguished from those of similar *H. atricapillus* and *H. pileatus* by the lack of a distinct introductory series of notes, commencing instead with a relatively rapidly and evenly

paced trill of essentially uniformly structured notes; from much faster and more uniformly paced loudsong of *Herpsilochmus praedictus* by overall much slower pace and conspicuously decelerating finish. One common call is immediately distinguishable from presumably homologous calls of near relatives on note structure and auditory quality. **Genetic divergence.**— Separated from its sister-species *Herpsilochmus praedictus* west of the Rio Madeira by approximately 4% sequence divergence in the mitochondrial gene ND2 (see *Phylogenetic relationships and taxonomy*, below).

Distribution.— Restricted to central Amazonian Brazil on the right bank of the Rio Madeira in the Aripuanã-Machado interfluvium: from the left bank of the Rio Aripuanã upriver to its confluence with the Rio Roosevelt, from which point upriver it is known from both banks of the Roosevelt east to an unknown limit (probably the Rio Aripuanã, almost certainly not as far east as the Rio Sucunduri) in the state of Amazonas and extending into northwest Mato Grosso south and west to the right bank of the Rio Machado (or Ji-Paraná) in the state of Rondônia (Fig. 1). Focused searches on the right bank of the Aripuanã and left bank of the lower Machado have been sufficiently extensive to establish absence of the species across these rivers; southern range limits remain unknown.

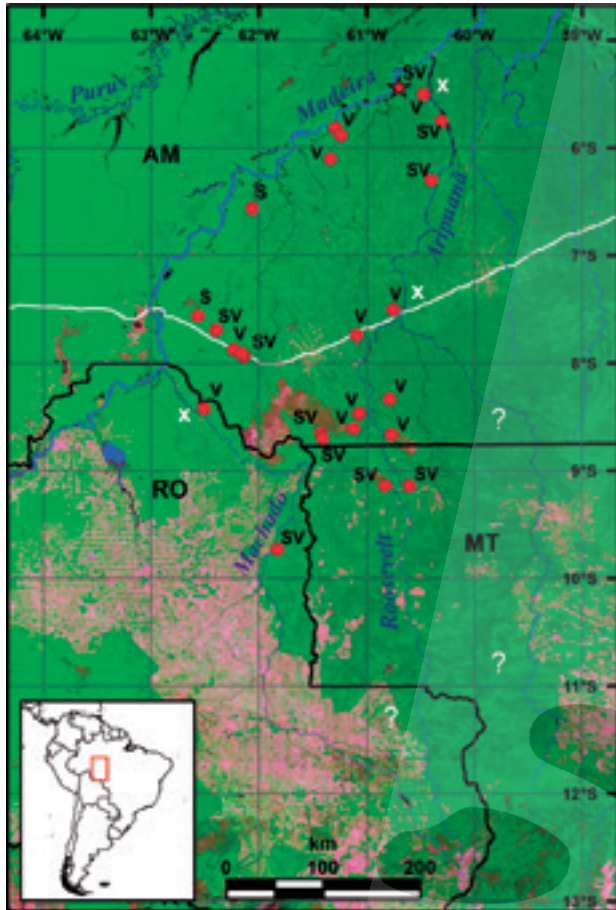
Description of holotype.— See color illustration and Figure 2A. Alpha-numeric color designations determined through direct comparison with Munsell soil color charts (1994); colors in quotation marks are chart designations. Plumage fresh and unabraded, no wing or tail molt; skull 50% ossified. Tiny feathers of forecrown black extensively tipped with “yellowish brown” (10YR 5/8) imparting a streaked or dappled effect. Crown black with irregularly scattered, short but conspicuous whitish streaks or spots (depending on feather arrangement) formed by white distal margins of some feathers. Preocular/loral area whitish, postocular

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⁴ Genus *Herpsilochmus* 8: 601.



stripe same black as crown and contrasting strongly with bold, whitish superciliary and facial region. Sides of neck and entire upperparts medium-gray (Gley chart 2: 5/5PB) with a weak olive brown tinge in the mantle. Concealed white interscapular patch present. Throat and malar region pale creamy-white (near 10YR 8/3), this color extending faintly into the lower facial region and posteriorly through the upper breast, becoming whitish in central breast; sides of breast, flanks, and thighs mixed slightly grayish; lower belly and undertail coverts slightly paler than throat. Tail distinctly graduated, outer rectrices about 16 mm shorter than central pair. Outer rectrices white with black bases, black most extensive on proximal webs. White tips on successive pairs decreasing from outermost to innermost, central rectrices with only a minute whitish spot at tip, but with distinct whitish edges most conspicuous on proximal margin. Wing coverts black, each feather marked with a conspicuous white tip, slightly more extensive on distal web. 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 same gray as mantle with a contrasting white margin on distal webs, forming a conspicuous white stripe overlying proximal ends of wing bars. Bend of wing white, greater primary coverts pale brownish with a minute buff spot on distal web at feather tip. Alula black with contrasting whitish margin on distal web reaching tip. Remiges blackish-brown with narrow but conspicuous brownish fringes on central portions of distal webs. Inner secondaries more brownish and marked with conspicuous, even white margins on distal webs. Underwing coverts about the same pale creamy-white as breast. **Soft parts in life:** iris dark brown, maxilla black, mandible gray; tarsus and toes dark gray. **Standard measurements:** total length (just before specimen preparation) 113 mm; bill (culmen from base at skull) 17.1 mm; bill from anterior edge of nares 9.5 mm; bill width at anterior edge of nares 4.4 mm; wing (chord) 52.2 mm; tail 39.9 mm; tarsus 17.7 mm; mass 10.8 g.

Etymology.— We are pleased to name this antwren for Douglas F. Stotz, who discovered the bird in 1986. Doug’s keen field skills combined with extensive experience as a collections-based ornithologist and a natural ability to work well with others have brought him a particularly enlightened perspective on the study of Neotropical birds; his influence has been greatly appreciated by colleagues both at home and across South America. Doug has been involved in conservation-oriented research at the Field Museum in Chicago, USA, since 1994 and is currently ECCO Senior Conservation Ecologist.

The English and Portuguese names refer to the Rio Aripuanã, which marks the northern and probably eastern range limits of the new species. We decided that the more informative name "Aripuana-Machado Antwren" would not be so utilitarian.

REMARKS

Type series.— The allotype of *Herpsilochmus stotzi* is INPA 2229, adult male, from the left bank of the Rio Aripuanã about 90 km south of Novo Aripuanã at "Tucunaré". Remaining paratypes of *H. stotzi* are the following twenty-four specimens: INPA 2228 male (AM, left bank Rio Aripuanã, Rio Arauazinho about 130 km south Novo Aripuanã) and 2231 male (taken together with the holotype); Museu de Zoologia da Universidade de São Paulo (MZUSP) 92292-92295 male, juv unsexed, female, respectively (MT, left bank Rio Roosevelt) and 92296 male (MT, right bank Rio Roosevelt); Louisiana State University Museum of Natural Science (LSUMNS) 182837 male, 182838 male, 182839 male, and 182840 female (MT, left bank Rio Roosevelt); 182841 female and 182842 male (MT, right bank Rio Roosevelt); Museu Paraense Emílio Goeldi (MPEG) 39961 female, 39962 female, and 39963 male (RO, Cachoeira Nazaré, east bank Rio Jiparaná); 57643 and 57644 (AM, Manicoré, "rodovia do estanho" km 126); 57645 male and 57646 male (AM,



Figure 1. Geographic distribution of *Herpsilochmus stotzi* in south-central Amazonian Brazil. A red star marks the type locality at "comunidade Itapinima," about 80 km se of Manicoré and letters adjacent to red locality dots provide documentation: S = specimen; V = vocal recording. A white X marks places where BMW has searched for *H. stotzi* and is confident that it is absent although it occurs immediately across the Aripuanã or Machado rivers at these points; a white ? indicates areas that have not been inventoried where the species is expected to occur and range limits need to be determined. Black lines mark the boundaries of Brazilian states as indicated by their official abbreviations: AM = Amazonas; RO = Rondônia; MT = Mato Grosso. The federal highway BR-230 ("Transamazônica") is shown in white.

Figure 2. Digital images of *Herpsilochmus stotzi*. (A) adult female (AM; right bank Rio Madeira along the BR-230 "Transamazônica" highway; 10 December 2011, MZUSP 92435), note the extensively whitish anterior underparts (this individual is slightly paler than average); (B) adult male (MT; left bank Rio Roosevelt; 6 August 2011, MZUSP 92292); (C) adult male (AM, right bank Rio Roosevelt, Igarapé Cujubim above "Pousada Rio Roosevelt"; 22 December 2012). Images by Fabio Schunck (A, B) and Bob Sprague (C).

Manicoré, “rodovia do estanho” km 137); 59031 female (AM, Humaitá, Ipixuna Indigenous Territory); Field Museum of Natural History (FMNH) 330514 male, 330515 male, and 330516 female (RO, east margin of Rio Jiparaná, Cachoeira Nazaré).

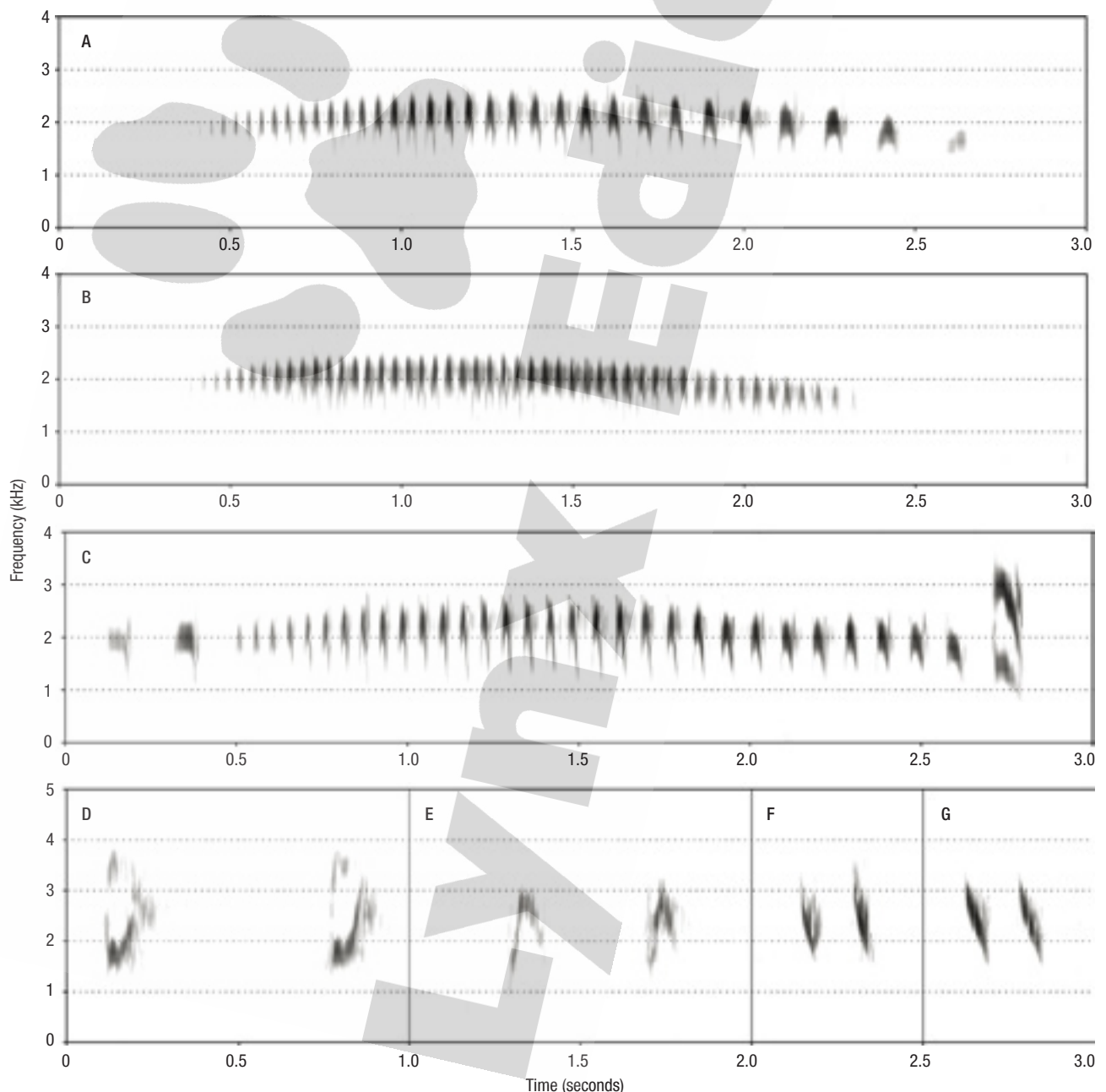
The holotype is subadult (ovary smooth, no oviduct found, Bursa of Fabricius 4×3 mm, skull 50% ossified); all other females at hand are adults. The adult female of *H. stotzi* is characterized by decidedly pale underparts, more extensively whitish – especially through the belly and undertail coverts – than in any species in the *H. pileatus* complex. Adult females also possess a small, blackish preocular spot apparently lacking in the holotype (this could be an artifact of specimen preparation) and some have the orangish color of the forecrown washing well into the loreal region, contrasting with the whitish superciliary behind it. There is no appreciable morphological variation among adult males (Fig. 2B, C are typical individuals). The single juvenile specimen in the above series is an unsexed fledgling collected 10 Aug 2011 on the left bank of the Rio Roosevelt in northwest Mato Grosso state (MZUSP 92294). It is white below with the faintest wash of buff on the throat, and gray crown spotted/streaked with buff. It is a tiny thing (total length 77 mm, mass 6 g), but the whitish spots on the wing coverts are about as large as those of adults. It looks very much like excellent photos of fledglings of *H. atricapillus* posted on the website www.wikiaves.com.br (archive numbers WA50445 and WA592054)

except that the pale markings on the crown appear to be more sharply defined.

Ecology and behavior.— Behavior of *H. stotzi* closely parallels that described for *Herpsilochmus gentryi* (Ancient Antwren) and is characteristic of the genus (Whitney and Álvarez 1998), including regular if not inveterate foraging with mixed-species canopy flocks of other insectivores. *Herpsilochmus stotzi*, in parallel with *H. gentryi* of local distribution in upper Amazonia, occurs locally in lower-stature (yet, “old-growth”) *campinarana* forest on especially nutrient-poor and some poorly drained soils. This forest or woodland is abundant in the Aripuanã-Machado interfluvium. It usually does not exceed about 20 m canopy height and is often less than about 12 m tall, featuring a high density of narrow trunks and narrow tree canopies. Occurrence is patchy in tall, undisturbed *terra firme* forest, but presence of dense stands of the understory palm *Lepidocaryum tenue* (*caranaí* in Portuguese) seems to be a reliable indicator of the presence of *H. stotzi* in the canopy.

Unlike some understory thamnophilids endemic to the Aripuanã-Machado “mini-interfluvium” (of Cohn-Haft *et al.* 2007, or “speciation block,” as BMW prefers to call it) that are known to stop at the left bank of the Aripuanã and, farther upriver, at the left bank of the Roosevelt (e.g., *Hypocnemis rondoni* and *Epinecrophylla dentei* described in this volume, and an as-yet

Figure 3.
Loudsongs and calls of *Herpsilochmus stotzi* for comparison with near relatives. (A) *H. stotzi* loudsong showing lack of introductory notes and other distinctions relative to other species (MT, left bank Rio Roosevelt; 6 August 2011; Whitney recording BMW-14046, MZUSP 92292). (B) *H. praedictus* loudsong showing very fast, steady pace (AM, 50 km south Humaitá; 17 December 2011, Whitney recording BMW-15078). (C) *H. atricapillus* (Minas Gerais, 15 km north Vargem Bonita; 23 September 1990, Whitney recording in Isler Antbird Inventory BMW.048:11). Introductory notes are characteristic of *H. atricapillus*; the distinctive final note present here is more variable. (D) *H. stotzi* “tchwee” call (AM, along highway BR-230 [“Transamazônica”] east of Humaitá; 8 December 2011, Whitney recording BMW-14806, MZUSP 92433). (E) *H. praedictus* (AM, ca. 50 km W Porto Velho at “Campo do Ramal do Mucuí,” km 37, 8°40’S/64°22’W; Cohn-Haft recording, MCH2007.14B. ca25); (F) *H. stotzi* common call (AM, along highway BR-230 [“Transamazônica”] east of Humaitá; 8 December 2011, Whitney recording BMW-14806, MZUSP 92433). (G) *H. praedictus* (AM, ca. 50 km W Porto Velho at “Campo do Ramal do Mucuí,” km 37, 8°40’S/64°22’W; Cohn-Haft recording, MCH2007.18B. ca10, ML 169990). This vocalization appears to be indistinguishable between the two sister-species.



unnamed form of *Myrmeciza hemimelaena*, among others), canopy-inhabiting *H. stotzi* has passed the latter river and occurs widely in well-developed *campinarana* forest. Whether individuals or large numbers of them occasionally or regularly cross the Roosevelt is unknown, but as far down as northwestern Mato Grosso, the Roosevelt is locally less than 100 m wide in the dry season and cluttered with rocky, shrub-covered islands. However, there appear to be few places along this stretch of the Roosevelt where appropriate *campinarana* forest grows on opposite banks of the river, which might represent an ecological impediment to crossing different from the risk associated with exposure in prolonged flight. Not much farther upriver, where forested land starts to rise toward the edges of the Brazilian Shield, the Roosevelt narrows dramatically and *H. stotzi* and most other small birds must routinely cross the river.

Through the majority of its range, *Herpsilochmus stotzi* is the only member of the genus present. On the right bank of the Rio Roosevelt and also on the right bank of the Rio Machado near "Cachoeira Nazaré" (Douglas Stotz, pers. comm.), it is sympatric with *H. rufimarginatus* (Rufous-winged Antwren), which occupies mostly river-edge forest almost to the exclusion of *campinarana*. The two can occasionally be heard from the same place, but they apparently have little ecological overlap. East of the Roosevelt, however, it appears that *H. stotzi* is even more tightly restricted to *campinarana* forest and is not to be found over extensive areas of tall *terra firme* forest.

Stomach contents of eight individuals were examined; all contained fragments of insects and two held parts of spiders (further details available in SI). Nesting has been confirmed in July and August, with fledglings a day or two out of the nest observed being fed by parents. High-definition video of *Herpsilochmus stotzi* in habitat may be viewed on the Internet Bird Collection (IBC) website.

Vocalizations.— Loudsongs and calls of *Herpsilochmus stotzi* are similar to those of other species, but entirely diagnosable. Songs are softly purring, rolling trills, of roughly 1.7 s (1.5–2.0 s) duration, decelerating strongly throughout (final internote intervals twice initial internote intervals). Notes within the trill appear as inverted "V"s in spectrograms, and during the song they rise in frequency from approximately 2.0 kHz to 2.5 kHz, before falling back at the end to approximately the starting frequency (Fig. 3). Both males and females sing. It is possible to hear subtle differences in peak and final frequency between members of a pair, and it appears that the female song is the slightly higher-pitched. The songs are most like those of *H. atricapillus*, which differ most conspicuously by beginning with 1–3 single notes prior to the trill; these introductory notes are absent in songs of *H. stotzi* (compare Fig. 3A and 3C; interested readers should compare vocalizations of these birds by listening to recordings posted to the IBC website). The song of its sister species, *H. praedictus* (Fig. 3B), is longer, faster, lower-pitched, and has twice as many notes; song of *H. dorsimaculatus* is also similar, but it accelerates throughout, rather than decelerating (see Cohn-Haft and Bravo, this volume).

An unusual song-like vocalization given repeatedly by a single juvenile individual was recorded once (Whitney recordings BMW-14260 and 14261). In relation to adult songs, this vocalization is longer, slower, higher-pitched, and lacks conspicuous deceleration (reviewable on IBC website). We have no analogous songs from juveniles of other species for comparison, but it does not sound like typical song of any *Herpsilochmus* species.

Calls of *H. stotzi* are also distinctive. One frequently uttered call is a "tchwee" note with a conspicuous double inflection between 2.0 and 2.5 kHz before continuing to rise sharply (Fig. 3D); it is perhaps most similar to a common call of *H. atricapillus*. It is structurally distinct from the homologous call of *H. praedictus* (Fig. 3E), and is higher-pitched; it also sounds more nearly bisyllabic. Another call less frequently given is a short (0.05–0.08s duration), sharp "chew" (Fig. 3F), given singly or in series of 2–5 notes, and may be indistinguishable from that of *H. praedictus* (Fig. 3G). Each note has a distinctive shape, descending sharply from about 3 to 1 kHz, with the most intense (loud-

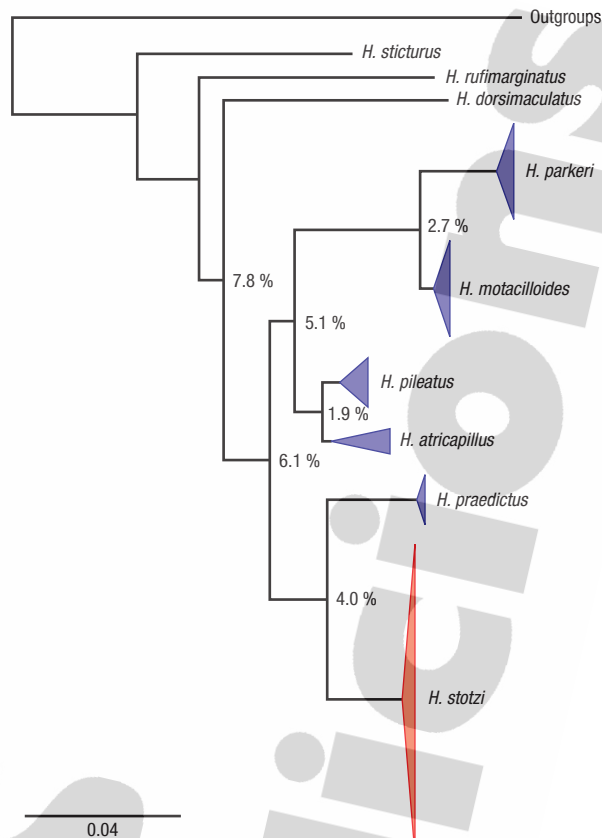


Figure 4. Maximum-likelihood tree topology of the genus *Herpsilochmus* showing that *H. stotzi* is sister to *H. praedictus* (from west of the Rio Madeira, described in this volume by Cohn-Haft & Bravo) and that this pair is sister to the well-resolved *H. pileatus* complex. All shown resolved nodes have bootstrap support values based on 1000 replicates >70 and posterior probability values >0.95.

est) part between roughly 2.0 and 2.8 kHz. Despite the general similarity of *H. stotzi* songs and the "tchwee" call to homologous vocalizations of *H. atricapillus*, several common calls of that species are not at all similar to any calls in the repertoire of *H. stotzi* (see Whitney *et al.* 2000 for an analysis of vocalizations of *H. atricapillus*). Selected sections of most of the above-cited recordings are available for listening to on the IBC website.

Phylogenetic relationships and taxonomy.— DNA sequence data for the mitochondrial gene NADH subunit 2 (ND2, 1041 bp) were obtained for 35 individuals of 7 species in the genus *Herpsilochmus*, including those belonging in the *H. pileatus* complex (*sensu* Whitney *et al.* 2000; see SI 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 *Herpsilochmus stotzi* is sister to *H. praedictus* (Cohn-Haft and Bravo 2013, this volume) forming a clade that is distributed on both sides of the Rio Madeira (Fig. 4). This pair of species is sister to the *H. pileatus* complex (*sensu* Whitney *et al.* 2000). As mentioned above, the middle and lower Rio Roosevelt is a distributional barrier for some species of birds, but two specimens of *H. stotzi* from the right bank in Mato Grosso were indistinguishable from the rest of the sample (specimens examined listed in SI), which indicates that gene flow around/across the upper Roosevelt is essentially uninterrupted.

Conservation.— *Herpsilochmus stotzi* is common and faces no immediate threats to its existence. However, its preferred *campinarana* forest habitat borders or overlaps several confirmed *campina* localities of the newly described *Zimmerius chicomendesi* (Chico's Tyrannulet; Whitney *et al.* 2013, this volume), and threats to habitat along the BR-230 ("Transamazônica") highway identified in that paper are also applicable to conservation of *H. stotzi*.

As an ancillary note, in mid-December, 2011, BMW observed that the North American thrush *Catharus fuscescens* (Veery) was common in the same dense *campinarana* forest favored by *H. stotzi* and it seems likely that this specialized forest type is important in the poorly known (Remsen 2001, Heckscher *et al.* 2011) wintering habitat of that species.

Acknowledgments.— We are especially grateful to Marcelo Félix for excellent specimen preparation and camaraderie in the field and to Luis Cleyton Holando Lobato for fine logistical assistance and secure travel on some precarious Amazonian roads during the early rainy season of 2011. Many thanks to Waner Costa of “Pousada Rio Roosevelt” in southern Amazonas state for outstanding service and comfort provided over the course of several years to Field Guides tour groups under BMW’s guidance. Thanks to the Fundação de Amparo à Pesquisa no Estado de São Paulo (FAPESP) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the concession of grants (Evolução da Fauna de Vertebrados Terrestres Brasileiros do Cretáceo ao Presente: Paleontologia e Filogenia, CNPq 565046/2010-1), fellowships (LFS) and for the authorization for collecting and Research by Foreigners and also to the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA – SISBIO) for collecting permits. MCH thanks PPBIO of Brazil’s Ministério do Meio Ambiente (expeditions coordinated by Lúcia Rapp Py-Daniel). We are grateful to curators and collection managers (see SI for list of museums) for allowing access to tissue samples and specimens under their care, especially to Robb T. Brumfield and Donna L. Dittmann (LSUMNS) and Mark B. Robbins (KU). Ricardo Belmonte-Lopes and Marcos Bornschein kindly provided access to a sample housed at MCP. Molecular work was supported by grants to GAB from the Frank Chapman Memorial Fund – AMNH, the American Ornithologists’ Union, the LSUMNS Big Day Fund, LSU Biograds, and NSF (DEB-1011435). We are grateful to Natalia Aristizábal and Luciano Naka for their assistance in obtaining sequences. We are grateful to NASA for free and open access to the MODIS (EOSDIS) satellite imagery used to produce the map image. Thanks very much to Marco Antonio Rêgo for kindly preparing the map and to Bob Sprague, Field Guides tour participant December, 2012, who contributed the photo of *H. stotzi* from the right bank of the Rio Roosevelt. Gabriel Biffi of the Entomology Department of the MZUSP graciously helped us by identifying arthropod stomach contents. We are appreciative of the Brazilian photographers Juliano Silva and Marcus Moreira for posting their excellent photos of fledgling *Herpsilochmus atricapillus* on www.wikiaves.com.br. Richard Banks, Thomas Schulenberg, and Douglas Stotz provided helpful comments on the manuscript. Hilary Burn painted the figures of *H. stotzi* that accompany this description.

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