ECOTROPICA 20: 83–86, 2014

REDISCOVERY OF THE RARE TACARCUNAN BAT *LASIURUS CASTANEUS* (CHIROPTERA: VESPERTILIONIDAE) IN COSTA RICA

David Villalobos-Chaves*[1, 2] and Carl. W. Dick[3]

[1] Escuela de Biología, Universidad de Costa Rica, San Pedro Montes de Oca, San José, Costa Rica
[2] Asociación Theria, Desamparados, San José, Costa Rica
[3] Department of Biology, Western Kentucky University, Bowling Green, KY, USA

Key words: restricted distribution, Lasiurus castaneus*, rare species, Costa Rica.*

INTRODUCTION

The most species-rich and widely-distributed family of bats is the Vespertilionidae (Reid 2009, LaVal & Rodríguez-Herrera 2002). Worldwide, this family comprises 48 genera, with five of these occurring in Central America (*Myotis, Eptesicus, Rhogeessa, Bauerus* and *Lasiurus*) (Simmons 2005, Reid 2009).

The genus *Lasiurus* includes small to medium sized bats, characterized by brightly colored or banded dorsal pelage, ears either short and rounded or somewhat elongated, short tragi, and a thickly furred dorsal uropatagium (Reid 2009). In Costa Rica, four species of *Lasiurus* are known to occur (*L. blossevillii, L. castaneus, L. ega* and *L. intermedius*) (LaVal & Rodríguez-Herrera 2002, Rodríguez-Herrera *et al.* 2003). In the Neotropics, all of these species are rare, uncommon or with limited distribution. Moreover, little information is available regarding their biology, ecology, and natural history (LaVal & Rodríguez-Herrera 2002, Pineda *et al.* 2008a). For example, not until 2003 was the first specimen of the northern yellow bat (*Lasiurus intermedius*) collected in Costa Rica (Rodríguez-Herrera *et al.* 2003). Another example is the extremely rare Tacarcunan bat, *Lasiurus castaneus* Handley.

Lasiurus castaneus is apparently confined to Costa Rica and eastern Panamá, and known from very few individuals collected in evergreen forest of low to intermediate elevation (1500-2000 m – Reid 2009, LaVal & Rodríguez-Herrera 2002). The species is a medium sized bat with dorsum a deep chestnut brown (between morocco red and chestnut), darkest on the tail membrane. The underparts are dark brown frosted with buffy yellow, with whitish patches on the shoulders. The fur is long and thick, membranes are black and tail membrane is thickly furred for about 2/3 the length of tail (Handley 1960, Reid 2009; Fig. 1a).

In Costa Rica, *L. castaneus* was previously known only from two captures (one male and one female) during January and February 1981, in mist nets in and adjacent to the Monteverde Cloud Forest Reserve (MCFR), Cordillera de Tilarán (10° 25' N, 84° 50' W – Dinerstein 1985). The habitat in which both bats were captured included elfin forest along the continental divide (ca. 1500 m – Dinerstein 1985). Prior to these captures, the species was known only from the type locality in eastern Panamá (Río Pucro, Darién, Tacarcuna Village, 975 m), where it had been captured in mist nets set over streams in evergreen forest (Handley 1960, 1966). The species was designated "Vulnerable" in 1996 by the IUCN, and is currently listed as "Data Deficient" due to the absence of recent information on its biology (Pineda *et al.* 2008a).

Here, we report the capture of two individuals of *L. castaneus* in Costa Rica, following a 31 year period without any records of this species.

* e-mail: avi3187@gmail.com

METHODS

On 08 March 2012, we erected six mist nets (five 2 X 12 m and one 2 X 6 m), in a "T" and "V"-shaped pattern, across and along the road of the San Gerardo Field Station in Santa Elena, Monteverde, Puntarenas Province, Costa Rica (property of Children's Eternal Rain Forest). The nets were open from 19:40 h to 00:00 h. Surrounding vegetation consisted of secondary forest and pasture. One net (12 m) was set across a small stream that crossed the road (Fig. 1b). The study site was characterized by the presence of cloud forest with a high diversity and abundance of epiphytes, and a dense understory of shrubs and large herbs (Nadkarni *et al.* 1995). Cloud forest typically exists above 1500 m on the Pacific slope and up to the Continental Divide. Moreover, on the Atlantic slope its range is between 1300-1400 m (Harber 2000). The distribution of the cloud forest includes the communities of Monteverde, Santa Elena, La Cruz and Las Nubes (Harber 2000), where the annual rainfall oscillates between 2500-3500 mm and the canopy height varies from 20-30 m in sheltered sites and between 5-10 m in elfin forest (Harber 2000).

From the specimens collected in the field we recorded the following external measurements as detailed by Reid (2009): head and body length (HB), tail length (T), right hind foot (HF), ear length (E), tragus length (Tr), forearm length (FA) and weight (Wt).

RESULTS

On 08 March 2012, at about 20:00 h, we captured and collected two adult males of *Lasiurus castaneus* in a 12 m mist net set across a small stream that passes over the road of the San Gerardo Field Station (10° 21' 48'' N, 84° 47' 20.6'' W; 1203 m). The specimens were preserved as skins and skulls and deposited in the collection of the Museo de Zoología, Universidad de Costa Rica (1 ♂: UCR #2538 and 1 ♂: UCR #2539). They have the following measurements (mm): UCR #2538 —— head and body length: 52.70; tail length: 50; right hind foot: 7.52; ear length: 11.51; tragus: 5.31; forearm length: 45 and weight: 12.0 g. UCR #2539 —— head and body length: 55.56; tail length: 47; right hind foot: 8.97; ear length: 11.41; tragus: 5.22; forearm length: 44 and weight: 11.5 g.

The only similar bat species in the country is the western red bat, *Lasiurus blossevillii* (Supplementary Fig. 1b). However the two species are distinguished by the diagnostic deep chestnut brown color above and the distal fourth of tail membrane naked in *L. castaneus* (Supplementary Fig. 1a, 1c), as well as the larger size in the following measurements in males (Shump, Jr & Shump 1982): forearm greater than 40.6 (UCR #2538 = 45, UCR #2539 = 44) and length of ears greater than 10.5 (UCR #2538 = 11.51, UCR #2539 = 11.41). The forearm length of our specimens are larger than any reported for *L. blossevillii* (Hall 1981, Shump, Jr & Shump 1982). Other species of bat captured at our study site included *Sturnira hondurensis* (7), *Sturnira mordax* (2), *Carollia sowelli* (6), *Carollia castanea* (2), *Hylonycteris underwoodi* (2), *Anoura cultrata* (1), *Pteronotus gymnonotus* (2), *Myotis keaysi* (7), *Eptesicus brasiliensis* (1) and *Lasiurus blossevillii* (1).

Both *L. castaneus* were captured simultaneously, just above the streambed in the lowest shelf of the same net, and about 1 m apart. The stream was characterized at the time of capture by relatively low water level, with the substrate being stones and large cobbles (Fig. 1b). Besides these two captures, we captured under identical conditions (same mist net, same time) an individual of *L. blossevillii*.

DISCUSSION

Our captures represent the second report of *L. castaneus* in Costa Rica, and the second locality of the species for the country. Since Dinerstein (1985) reported *L. castaneus* for the first time 31 years prior to our findings it is remarkable that no other captures of the species have been made, especially given the extensive field work in the cloud forest area of Monteverde, conducted by R. K. LaVal and collaborators.

According to Handley (1960), the type locality of *L. castaneus* is the Río Pucro, Darién, Tacarcuna Village, where a single individual was captured in a mist net over a stream. This brief description of the type locality of *L. castaneus* is similar to our locality at the San Gerardo Field Station in Santa Elena, Monteverde as both our individuals were captured near to the water in the lowest shelf of the mist net. Both reports (Handley 1960 and this paper) suggest that at the time of capture, bats were flying low and close to the water. We suggest that the fact all bats were captured near to streams and water resources may be due to several non-exclusive reasons. The first possibility is that bats were drinking water from the stream, and hence were captured by the mist nets directly above the surface. Similar situations have been documented in some localities of tropical dry forest of Costa Rica, where in the dry season several

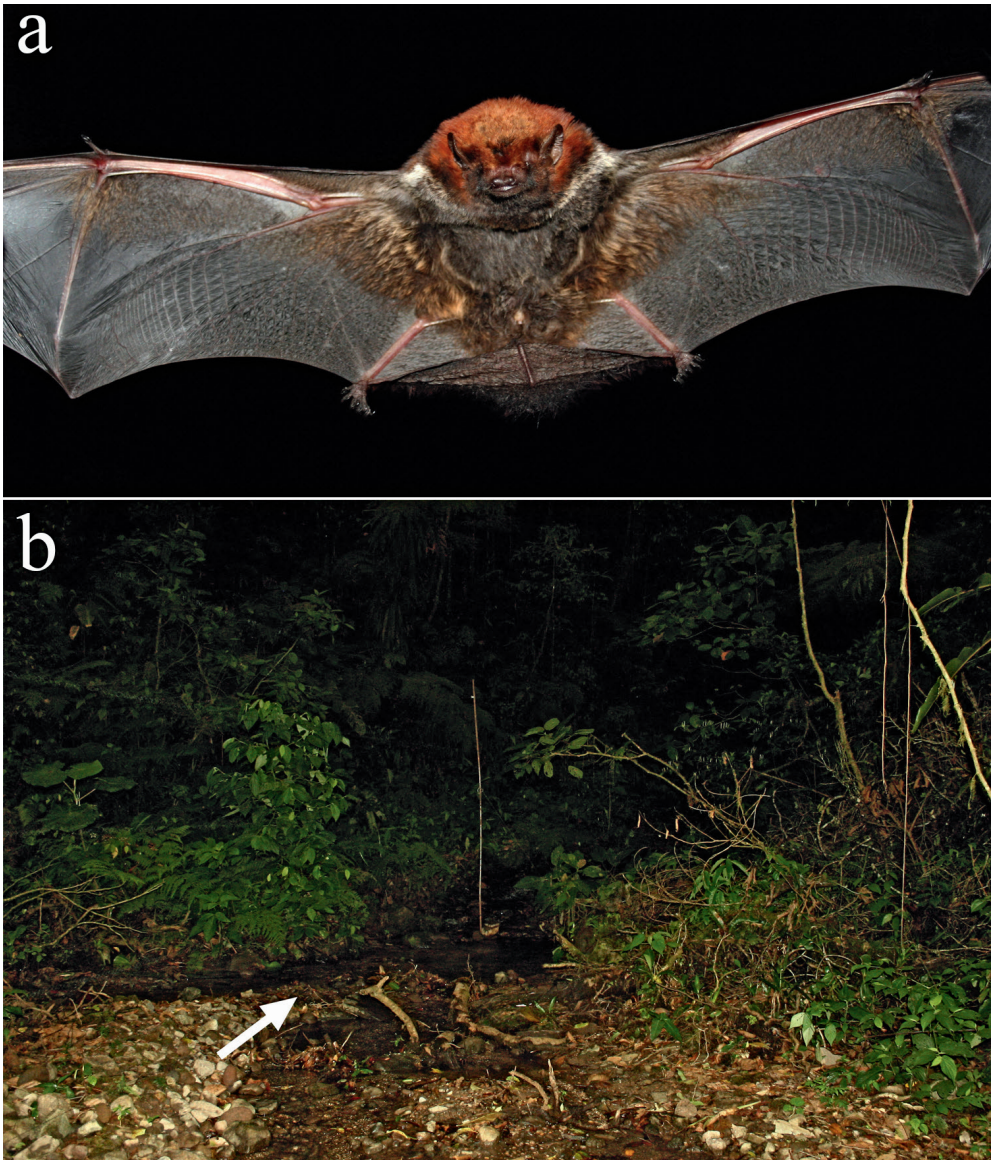

FIG 1. Photograph of a live individual of *Lasiurus castaneus* from San Gerardo Field Station, Santa Elena, Monteverde, Puntarenas (a); site of capture of both individuals (b). Arrow indicates position of the bats captured simultaneously in the lowest shelf of a net set across a stream (photos C. W. Dick).

bat species approach open water bodies for drinking (see Pineda *et al.* 2008b). However, in contrast to the situation in the dry forest water was not a limiting resource at our capture locality. A second possibility is that bats were foraging on insects that were flying near to or emerging from the stream. Due to the small size of the insect fragments encountered in the bat feces, we were unable to determine taxonomic details of *L. castaneus*' insect diet. The third possibility is that our captures were simply coincidental, and that bats were captured as a consequence of the position of the mist nets (*i.e.*, nets located in a flight path). The details of our captures, and those described by Handley (1960), do suggest that

L. castaneus is most likely to be captured over streams in forested habitats. The San Gerardo Field Station in Santa Elena and the Monteverde Cloud Forest Reserve (Dinerstein 1985), both in Costa Rica, are located between 1200-1500 m above sea level, are in the same district and province, and approximately 7.6 km apart. Therefore, similar characteristics are shared by the sites, *e.g.*, vegetation structure, precipitation, temperature, and others. Conversely, the type locality of *L. castaneus* (Río Pucro, Darién, Tacarcuna Village – Handley 1960) is located at a slightly lower altitude (975 m), suggesting that the species may be restricted to forests of intermediate altitudes (975-1500 m) in Costa Rica and Panamá.

Based on all available information, we conclude that *L. castaneus* has distribution restricted to Costa Rican and Panamanian forests. Moreover, due to the paucity of captures of the species and the lack of reference calls that support acoustic monitoring data, the current situation of *L. castaneus* in both countries is still unknown. For the time being, the conservation status of the species will likely remain as "data deficient" (Pineda *et al.* 2008a) until more biological information, *e.g.*, on presence, abundance, diet, roosting ecology and reproductive patterns is generated by bat researchers interested in elucidating the population status of this uncommon species throughout its limited range.

Supplementary Online Materials available on http://www.gtoe.de/ecotropica/:

Supplementary Fig. 1. Photographs showing the differences between live individuals of *Lasiurus castaneus* (a) and *Lasiurus blossevillii* (b) from San Gerardo of Santa Elena, Monteverde, Puntarenas (photos C. W. Dick). (c) prepared skins of specimens of *L. castaneus* deposited in the collection of the Museo de Zoología, Universidad de Costa Rica showing the diagnostic deep chestnut brown color in the dorsum and the naked distal quarter of interfemoral membrane (photo D. Villalobos-Chaves).

ACKNOWLEDGMENTS

This work was supported in part by a grant from the National Science Foundation (DEB-0640331, DEB-1003459) and by Western Kentucky University (RCAP 11-8020). For permissions and permitting we thank the Monteverde Conservation League, Children's Eternal Rainforest, and MINAET-SINAC (Resolución No 053-2012-ACAT). The bat specimens were collected and deposited at the Universidad de Costa Rica under permit number 001-2012. Manuel Zumbado (INBio) and Isaac López Núñez (MINAET-SINAC) provided invaluable logistical support in securing research permits. We thank Eric Stamper and Ayodele Atolagbe for field assistance, and Wendy Brenes for logistical assistance. Finally, thanks are due to Richard K. LaVal, Robert Timm, and Bernal Rodríguez-Herrera for their advice and encouragement.

REFERENCES

Dinerstein, E. 1985. First record of *Lasiurus castaneus* and *Antrozous dubiaquercus* from Costa Rica. Journal of Mammology 66: 411-412.

Hall, E.R. 1981. The Mammals of North America. John Wiley and Sons, New York, New York.

Handley, C.O., Jr. 1960. Descriptions of new bats from Panama. Proceedings of the U.S. Natural History Museum 112: 468.

Handley, C.O., Jr. 1966. Checklist of the mammals of Panama. Pp. 753-795 *in* Wenzel, R.L., & V.J. Tipton (eds.). Ectoparasites of Panamá. Field Museum of Natural History, Chicago.

Harber, W.A. 2000. Plants and Vegetation. Pp. 39-94 *in* Nadkarni, N.M., & N.T. Wheelwright (eds.). Monteverde: ecology and conservation of a tropical cloud forest. Oxford University Press.

LaVal, R.K., & B. Rodríguez-Herrera. 2002. Murciélagos de Costa Rica. Costa Rica: Instituto Nacional de Biodiversidad.

Nadkarni, N.M., Matelson, T.J., & W.A. Haber. 1995. Structural characteristics and floristic composition of a neotropical cloud forest, Monteverde, Costa Rica. Journal of Tropical Ecology 11: 481-494.

Pineda, W., Rodríguez-Herrera, B., Samudio, R. & J. Pino. 2008a. *Lasiurus castaneus*. IUCN 2013. IUCN Red List of Threatened Species, version 2013.2. http://www.iucnredlist.org.

Pineda, W., Rodríguez-Herrera, B., & R.M. Timm. 2008b. Rediscovery, ecology, and identification of rare free-tailed bats (Chiroptera: Molossidae) in Costa Rica. Acta Chiropterologica 10: 97-102.

Reid, F.A. 2009. A Field Guide to the Mammals of Central America and Southeast Mexico. Second edition. New York: Oxford University Press.

Rodríguez-Herrera, B., Pineda, W., Fernández, M., & R.K. LaVal. 2003. First Record of *Lasiurus intermedius* H. Allen (Vespertilionidae) from Costa Rica. Bat Research News 44: 91.

Shump, Jr. K.A., & A.U. Shump. 1982. *Lasiurus borealis*. Mammalian species 183: 1-6.

Simmons, N.B. 2005. Chiroptera. Pp. 312-529, *in* Wilson, D.E., & D.M. Reeder (eds.). Mammal Species of the World. A Taxonomic and Geographic Reference. Third edition. Johns Hopkins University Press.