

An ecologically-significant range extension for Hahn's short-tailed fruit bat (*Carollia subrufa*) in southwestern Costa Rica

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Abstract

A range extension for Hahn's short-tailed fruit bat, *Carollia subrufa*, is reported which extends the distribution of the species from the Pacific Dry Forest into the Pacific Moist Forest ecoregion. This raises the possibility that the species may be more widely distributed in Costa Rica than currently supposed, adding almost 30,000 km² of potential range.

Keywords: Pacific moist forest, *Carollia*, Phyllostominae, Costa Rica

Introduction

Although Costa Rica has one of the best-known Neotropical bat faunas (c.f. Janzen and Wilson 1983; Laval and Rodriguez 2002), much of that knowledge is based on intensive studies at a relatively small number of field stations, and published distribution records for much of the country are sparse. Congeneric species of the short-tailed fruit bats, *Carollia*, (Chiroptera; Phyllostomidae; Carollinae) are amongst the most abundant but cryptic of Neotropical phyllostomids and pose particular challenges (Owen et al. 1984). Costa Rica hosts all of the five recognized species in the genus, *C. brevicauda*, *C. castanea*, *C. perspicillata*, *C. subrufa* and the newly described *C. sowellii* (Wilson and Reeder 1993; Baker et al. 2002). *C. perspicillata* is the most widespread of the group, being abundant in most habitats from sea level to approximately 1000 m on both Pacific and Caribbean slopes (Janzen and Wilson, 1983; Laval and Rodriguez 2002).

C. subrufa is currently considered to be relatively uncommon in Costa Rica, and confined to the lowland dry forest of Guanacaste Province, northwestern Costa Rica (Reid 1997; Laval and Rodriguez 2002), although as these authors note, the difficulty of distinguishing *C. subrufa* from *C. perspicillata* means that the species may be more common than currently supposed. The close morphological similarity between *Carollia* species is likely a result of relatively recent divergence, as

supported by molecular data from Guyana (Clare et al. 2006).

Here, we report the first record of *C. subrufa* from the Pacific lowland wet forest of southwestern Costa Rica.

Material and Methods

Bats were netted on June 8, 2007 at the Firestone Center for Restoration Ecology, 3km northeast of Dominical, Puntarenas Province, Costa Rica (9.279 N, 83.862 W), 300m elevation, using a 9m mist net set along a trail in a small (<1 ha) banana plantation. The orientation of the net was parallel to the nearby (20m) ecotone with a large tract of mature, Pacific Moist Forest. The net was opened at 6:30pm and closed at 9:00pm

Results

A non-reproductive adult male specimen of *Carollia subrufa*, (forearm length 40 ± 0.5 mm), was netted, measured, photographed and released. The genus and species was diagnosed as follows: the snout was not elongate, with a well-developed noseleaf that was pointed and not significantly taller than broad. The lower lip was ornamented with small wart-like structures surrounding a single larger 'wart'. The tail extended approximately half-way into a well developed uropatagium. The forearm was less than 46mm, and the ears were not greatly enlarged nor joined across top of head (Family Carollinae).

The lower incisors were bilobed, the fur medium brown, short, with tri-colored dorsal hairs (the middle of the hairs being much lighter than the base or tip). The forearms were sparsely haired and the lower incisors equal in size (Figure 1) (*Carollia subrufa*).



Figure 1: Anterior dentition of *C. subrufa*. Firestone Reserve specimen.

Discussion

Whilst the extension of range reported here is modest in linear terms, the extension is of considerable ecological significance. The range of *C. subrufa* has previously been considered to be limited to the Pacific lowland dry forest (Laval and Rodríguez 2002; Reid 1997) of Mexico to northwestern Costa Rica (although Hoffman and Baker, 2003, consider *C. subrufa* absent from Costa Rica altogether). In Costa Rica, this dry forest life zone includes two ecoregions, *sensu* Olsen et al. (1991), these being 'Central American Dry Forest' and 'Costa Rican Seasonal Moist Forest' (NT0209 and NT0119 respectively of Olsen et al. 1991). The 105km southeasterly range extension (based on the closest dry/seasonal forest habitat) reported here places *C. subrufa* well within the Isthmian-Pacific Moist Forest ecoregion (NT0130) (Figure 2). If *C. subrufa* is indeed a true resident of the Isthmian-Pacific Moist Forest, and not merely an accidental, then the potential habitat available to the species is extended from ~78,700 km² to ~108,000 km² (data from Powell et al.

2007). It is apparent that the geographical and ecological limits to the distribution of *C. subrufa* are incompletely understood, and worthy of additional study along Pacific coastal Costa Rica. Future bat studies in Pacific moist forests would be well advised to pay careful attention to the possibility of *C. subrufa* captures amongst their ubiquitous *C. perspicillata*.

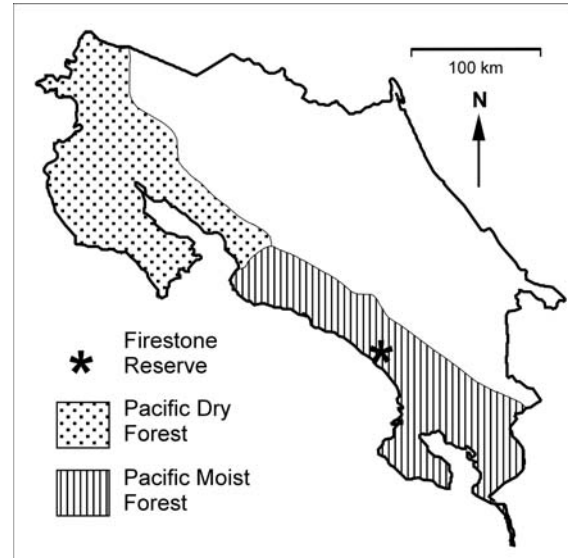


Figure 2: Ecoregions of western Costa Rica, showing the location of the Firestone Reserve

Acknowledgements

We thank Pitzer College for access to the Firestone Reserve, and Joyce Lundberg for drawing the map. This is scientific contribution #2 of the Firestone Center for Restoration Ecology.

References

- Baker R.J.; Solari S. and Hoffman F.G. 2002. A new Central American species from the *Carollia brevicauda* complex. Occasional Papers Museum of Texas Tech University 217: 1-12.
- Clare E.L.; Kim B.K.; Engstrom M.D.; Eger J.L. and Hebert P.D. 2006. DNA barcoding of Neotropical bats: species identification and discovery within Guyana. *Molecular Ecology Notes* 7: 184-190.
- Hoffman F.G. and Baker J. 2002. Comparative phylogeography of short-tailed bats (*Carollia*: Phyllostomidae). *Molecular Ecology* 12: 3403-3414.
- Janzen D.H. and Wilson D.E. 1983. Mammals. In: *Costa Rican Natural History* (edited by Janzen D.H.), pp. 426-501. University of Chicago Press, Chicago.

- Laval R. and Rodrigues B. 2002. Murcielagos de Costa Rica. Instituto Nacional de Biodiversidad, San Jose.
- Olsen D.M.; Dinerstein E.D.; Wikramanaya K.E.; Burgess N.D.; Powell G.V.N.; Underwood E.C.; D'Amico J.A.; Itoua I.; Strand H.E.; Morrison J.C.; Louks C.J.; Allnutt T.F.; Ricketts T.H.; Kura Y.; Lamoreux J.F.; Wettengel W.W.; Hedao P. and Kassem K.R. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. *BioScience* 51: 933-938.
- Owen J.G.; Schmidly D.J. and Davis W.B. 1984. A morphometric analysis of three species of *Carollia* from Middle America. *Mammalia* 48: 85-93.
- Powell G.; Palminteri S. and Schipper J. 2007. Isthmian-Pacific moist forests. http://www.worldwildlife.org/wildworld/profiles/terrestrial/nt/nt0130_full.html.
- Reid F.A. 1997. A field guide to the mammals of Central America and southeast Mexico. Oxford University Press. Oxford.
- Wilson D.E. and Reeder D.M. 1993. Mammal species of the World. A taxonomic and geographic reference. Smithsonian Institution Press. Washington.