

UNEXPECTED FINDING OF *Diclidurus ingens*, HERNÁNDEZ-CAMACHO, 1955 (CHIROPTERA, EMBALLONURIDAE), IN THE COLOMBIAN BIOGEOGRAPHIC CHOCÓ

Hugo Mantilla-Meluk^{1,3*}, Alex Mauricio Jiménez-Ortega^{2,3},
Leison Palacios², and Robert J. Baker¹

¹ Department of Biological Sciences Texas Tech University, Lubbock Texas, 79409-1313, USA, Phone 1 – (806) 742-7163 *[Corresponding author: <hugo.mantilla@ttu.edu>]. ² Universidad Tecnológica del Chocó Diego Luís Córdoba UTCH, Barrio Medrano, Carrera 22 No. 18B – 10, Quibdó, Chocó, Colombia. ³ Grupo de Investigación y Manejo de Fauna Silvestre del Chocó, UTCH. Barrio Medrano, Carrera 22 No. 18B – 10, Quibdó, Chocó, Colombia.

ABSTRACT: After nine years a new record of the greater ghost bat *Diclidurus ingens* is reported. This new specimen constitutes the tenth known record for the species and the only record available for the Biogeographic Chocó. The presence of *D. ingens* on the western side of the Andes in the Biogeographic Chocó represents a significant addition to the range of distribution of this species as well as an important piece of evidence to understand the ecological adaptations of these apparently rare bats in the Neotropics.

RESUMEN: Inesperado hallazgo de *Diclidurus ingens*, Hernández-Camacho, 1955 (Chiroptera, Emballonuridae) en el Chocó Biogeográfico Colombiano. Se reporta, después de nueve años, un nuevo registro del murciélago fantasma mayor *Diclidurus ingens*. Este nuevo registro constituye el décimo conocido para esta especie y el único disponible para el Chocó Biogeográfico. La presencia de *D. ingens* en la vertiente occidental de los Andes en la región del el Chocó Biogeográfico representa una adición significativa en el rango de distribución de esta especie así como también una importante evidencia para entender las adaptaciones ecológicas de estos raros murciélagos en el Neotrópico.

Key words. Colombia. Greater ghost bat. New records.

Palabras clave. Colombia. Murciélago fantasma mayor. Nuevo registro.

Bats within the genus *Diclidurus* are rare in museum collections and very little is known about their biology (Ceballos and Medellín, 1988). The genus *Diclidurus* encloses four species: *D. albus*, *D. ingens*, *D. isabellus*, and *D. scutatus* (Simmons, 2005). Among ghost bats species, *D. albus* has the widest distribution and it is the only species found on the western side of the Andes. On the contrary, *D. ingens* is only known from the eastern side of the Andes and Hood and Gardner (2007) re-

stricted its distribution to nine marginal localities (**Fig. 1**) including its type locality (Puerto Leguízamo, Department of Caquetá) in the Colombian Amazonia (Hernández-Camacho, 1955) which also constitutes *D. ingens* westernmost collecting locality.

After 53 years of paucity in museum additions of Colombian *D. ingens*, we report a confirmed new record of the greater ghost bat *D. ingens* from the Colombian Biogeographic Chocó. The new specimen was collected in



Fig. 1. Marginal localities of *Diclidurus ingens* showing *D. ingens* type locality (point in a square) and the new Chocoan record of *D. ingens* on the western versant of the Andes (star in a circle). Shaded relieve represents altitudes above 500 m.

the Municipio of Cértigui, Department of Chocó, Colombia ($5^{\circ} 24' N$, $76^{\circ} 35' W$) at an elevation of 57 m (**Fig. 1**). The preserved museum voucher specimen corresponds to an adult female as skin and skull, catalogued with number CZCH-001649 of the Colección Científica de Referencia de la Fauna del Chocó of the Universidad Tecnológica del Chocó, in Quibdó, Chocó, Colombia. The specimen was deposited at the collections by Leison Palacios and Pedro Einner Garrido (Field Number: PMC 004) who received the dead animal from Gloria Patricia Mosquera Copete on June 5th 2007.

The specimen was found inside a house where the bat was roosting in the ceiling. The collecting locality corresponds to a suburban area near the city of Quibdó surrounded by banana plantations and secondary forest. Mean annual precipitation at the Municipio of Certeguí is 6775 mm and the mean annual temperature is $26.7^{\circ}C$ ($34.9^{\circ}C$ maximum temperature and $22.0^{\circ}C$ minimum temperature; Rangel, 2004). At the collecting locality, *D. ingens* have been observed foraging near lamp-posts of a soccer field around 7:30 pm. Other

species collected at the same locality include: *Artibeus lituratus*, *Carollia perspicillata*, *Lonchophylla robusta*, and *Vampyroides caraccioli* (Mantilla-Meluk and Jiménez-Ortega, 2006).

We compared the skin and skull of our Chocoan specimen with the skin and skull of the holotype of *D. ingens* deposited at the Instituto de Ciencias Naturales (ICN 546) and the skin characters of *D. albus* holotype, deposited at the Zoologisches Museum der Humboldt Universität zu Berlin (ZMB 4478) mentioned by Hernández-Camacho (1955). Specimen CZCH 001649 shares the following discrete morphological features with the holotype of *D. ingens*: 1) presence of two black keratinized excrescences on the uropatagium at the same level of the interfemoral glandular sac or uro-marsipio (Hernández-Camacho, 1955), which is absent in *D. albus* holotype; 2) bicolored coat both ventrally and dorsally, contrasting with the unicolored coat described for *D. albus*; 3) dichromatic hairs with 2/5 of the hairs intense grey to blackish, while *D. albus* present a monochromatic pattern or not contrasting dichromatic hairs with the base of

the hairs cream to pale grey (**Fig. 2**); 4) large basisphenoid fossa separated by a complete septum (**Fig. 3d**), a character that is absent in *D. albus*, and 5) first and second upper premolars not in contact (**Fig. 3d**). The last character is used by Ojasti and Linares (1971) to separate *D. ingens* from other species in the genus. The rest of the species within the genus *Diclidurus* are smaller than *D. albus* and are easier to tell apart from *D. ingens*.

Skull and forearm measurements of the Chocoan specimen overlap skull and forearm measurements of *D. ingens* holotype. Skull measurements were larger than the ones recorded for a selected group of *D. albus* (**Table 1**). Measurements in the present work follow Simmons and Voss (1998). In the same way, the ratios among cranial measurements used as diagnostic characters by Hernández-Camacho (1955) also overlap those found in our Chocoan specimen of *Diclidurus* as follows: Ratio between the width of the zygomatic arc and the greatest length of the skull (66.66 holotype; 68.89 CZCH 001649); ratio between the basioccipital height and the greatest length of the skull (58.57 holotype; 57.08 CZCH 001649); ratio between the upper molar tooththrow and molar tooththrow (45.68 holotype; 54.77 CZCH 001649). Hernández-Camacho (1955) points on the remarkable differences that exist between *D. ingens* and *D. albus* lateral skull profiles. Specimen CZCH 001649 shares the flatter lateral profile of *D.*

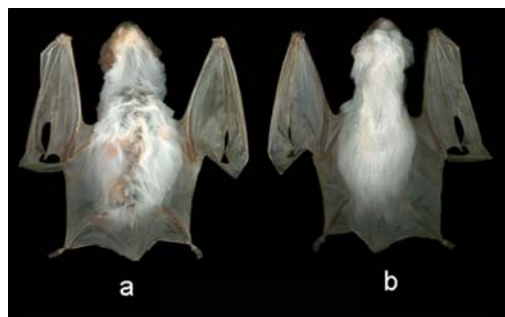


Fig. 2. Chocoan specimen of *Diclidurus ingens* (CZCH 001649); skin in ventral (a) and dorsal (b) views.

ingens (**Figs. 3a, b**). The angle formed by the intersection of the Frankfort and frontonasal planes in *norma lateralis* was greater than 100° in both *D. ingens* holotype and specimen CZCH 001649. Same angle in *D. albus* was smaller than 100°. The only characteristic mentioned in *D. ingens* description (Hernández-Camacho, 1955) not found in our Chocoan specimen is the presence of a fourth lobe in the second lower incisor. Hernández-Camacho (1955) also mentioned that *D. ingens* specimen from Caquetá is the only reported case of a fourth lobe in the second lower incisors among the 13 genera of the family Emballonuridae. Our specimen has the typical emballonurid trilobed lower incisors.

The confirmation of the presence of *D. ingens* on the western side of the Andes represents a significant addition to the range of

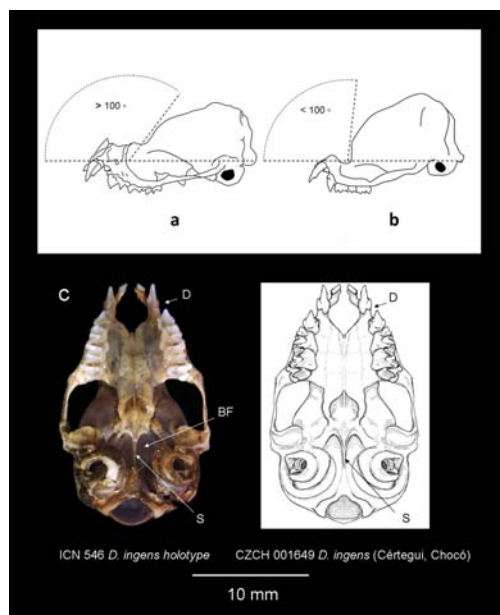


Fig. 3. Differences in terms of the angle formed by the intersection of the Frankfort plane (horizontal) and the frontonasal plane (vertical) in *norma lateralis* between *D. ingens* (a) and *D. albus* (b) from Brazil (Hernandez-Camacho 1955). Ventral view of the skull (*D. ingens*; holotype ICN 546, and CZCH 001649) showing the separation between the first and the second premolars (D) and the septum (S) separating the basisphenoid fossa (BF).

Table 1

Comparison of skull measurements between *D. ingens* holotype (*) and specimen CZCH 001649 collected in the Biogeographic Chocó. Skull measurements of *D. albus* from Venezuela deposited at the NMNH are included for comparisons. Measurements: Greatest Length of the Skull (1), Condylbasal Length (2), Zygomatic Breadth (3), Least Breadth Post-Orbital Constriction (4), Breadth of the Braincase (5), Length Maxillary Tooth-Row (6), Mastoid Breadth (7), Breadth Across Third Upper Molar (8), Breadth Across the Canines (9), Height of the Braincase (10), Length of the Mandible (11), Forearm (12).

Department	Specimen	1	2	3	4	5	6	7	8	9	10	11	12
Caquetá	ICN 546*	21.00	18.10	14.00	6.20	10.00	8.90	8.60	6.00	3.10	8.20	18.20	71.90
Chocó	CZCH 001649	20.66	18.57	12.67	5.90	10.92	8.60	8.40	3.90	3.60	7.90	14.40	67.90
Zulia	NMNH 418690	16.08	15.50	11.40	5.83	9.00	9.61	8.68	3.23	2.40	7.60	11.07	-
Amazonas	NMNH 407099	16.60	15.14	-	5.88	9.23	9.72	8.48	4.50	2.62	7.56	12.00	-
Amazonas	NMNH 407098	16.02	15.34	-	5.37	8.93	9.88	8.77	4.37	2.49	7.09	11.82	-
Amazonas	NMNH 407097	16.00	15.93	-	5.41	8.55	9.46	8.60	3.85	2.60	7.31	11.09	-

distribution of this species. Although our data indicates that our Chocoan specimen is closer in morphology with *D. ingens* (Hernández-Camacho, 1955) than with any other representative of the genus, further analyses using other data sets rather than morphology are suggested to test for phylogenetic affinities between *D. ingens* populations from both versants of the Andes. The presence of the trilobed lower incisors in combination with differences in some of the measurements suggest certain level of differentiation in isolation that merit consideration in future studies.

The ecological conditions of the Colombian Biogeographic Chocó are unique and have resulted in also unique bat assemblages as it is suggested by the high number of endemic bats that exist on the pacific Coast of Colombia (Mantilla-Meluk and Jiménez-Ortega, 2006; Mantilla-Meluk, 2007).

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to the community of Cértegui Chocó. We thank Yaneth Muñoz-Saba and the Instituto de Ciencias Naturales of the Universidad Nacional de Colombia; Nicté Ordoñez and Alfred Gardner for data collection at the Smithsonian Institution; Jineith Berrío Martínez, Universidad de Antioquia for her invaluable cooperation with the bibliography. We thank Jorge Salazar-Bravo and Miguel Pinto for their insightful comments on early versions of this manuscript.

LITERATURE CITED

- CEBALLOS G and RA MEDELLIN. 1988. *Diclidurus albus*. Mammalian Species 316:1-4.
- HERNÁNDEZ-CAMACHO J. 1955. Una nueva especie colombiana para el género *Diclidurus* (Mammalia: Chiroptera): *Diclidurus ingens*. *Caldasia* 7:87-98.
- HOOD C and AL GARDNER. 2007. Family Emballonuridae Gervais, 1856. Pp. 188-207, in: *Mammals of South America, volume 1, Marsupials, Xenarthrans, Shrews, and Bats* (AL Gardner, ed.) The University of Chicago Press, Chicago.
- MANTILLA-MELUK H. 2007. Lonchophyllini the Chocoan bats. *Revista Institucional Universidad Tecnológica del Chocó* 26:49-57.
- MANTILLA-MELUK H and AM JIMÉNEZ-ORTEGA. 2006. Estado de conservación y algunas consideraciones biogeográficas sobre la quiroptero fauna del Chocó Biogeográfico Colombiano. *Revista Institucional Universidad Tecnológica del Chocó* 25:10-17.
- OJASTI J and OJ LINARES. 1971. Adiciones a la fauna de murciélagos de Venezuela con notas sobre las especies del género *Diclidurus* (Chiroptera). *Acta Biológica Venezolana* 7:421-441.
- RANGEL OJ. 2004. Colombia diversidad biótica IV: El Chocó Biogeográfico/Costa Pacífica. Universidad Nacional de Colombia. Sede Bogotá. Ed. UNAL, 998 pp.
- SIMMONS NB. 2005. Order Chiroptera. Pp. 312-529, in: *Mammals Species of the World, a taxonomic and geographic reference* (DE Wilson and M Reeder, eds). Third Edition. Volume 1. The John Hopkins University Press, Baltimore.
- SIMMONS NB and RS VOSS. 1998 The mammals of Paracou, French Guiana: a Neotropical lowland rainforest fauna, part 1. Bats. *Bulletin of the American Museum of Natural History*, 237:1-219.