

SUPPLEMENTARY MATERIAL

Supplementary material of the article: A new species of Long-eared Brown Bat of the genus *Histiotus* (Chiroptera) and the revalidation of *Histiotus colombiae*

Material suplementario del artículo: Una nueva especie de murciélago pardo de orejas largas del género *Histiotus* (Chiroptera) y revalidación de *Histiotus colombiae*

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Appendix 1. Specimens examined. Acronyms: American Museum of Natural History, New York, USA (AMNH); Natural History Museum, London, UK (BMNH); Colección Zoológica Universidad del Tolima, Ibagué, Colombia (CZUT); Instituto Alexander von Humboldt, Villa de Leyva, Colombia (IAvH); Colección de mamíferos Alberto Cadena García, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia (ICN); Muséum d'Histoire Naturelle de la Ville de Genève, Geneva, Switzerland (MHNG); Museo de Historia Natural Universidad del Cauca, Popayán, Colombia (MHNUC); Museo de Historia Natural Universidad de Caldas, Manizales, Colombia (MHN-UCa); Museo de La Salle, Bogotá, Colombia (MLS); Museo Javeriano de Historia Natural Lorenzo Uribe, Bogotá, Colombia (MPUJ-MAMM); Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Perú (MUSM); Sección Mastozoología, Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador (QCAZ), and Colección de mamíferos, Universidad del Valle, Cali, Colombia (UV).

Histiotus cadenai sp. nov.: **Colombia: Caldas**, Manizales, vereda el Desquite, corregimiento 7, finca Martinica, Reserva hidrográfica Río Blanco (05°04'N, 075°23'W, 3500 m, ICN 16980♀ holotype, ICN 16981♀ paratype). **Quindío**, Municipio Génova, Predio Juntas (04°08'N, 075°44'W, 3400 m, UV 13274♂ paratype). **Risaralda**, Laguna del Otún, bosque del Oso 3 KM N, 1 Km O (04°08'N, 075°44'W, 3560 m, UV 2524♀ paratype). **Tolima**, Anzoategui, vereda El Palomar (04°36'N, 075°11'W, 3297 m, CZUT 674♂), Ibagué, vereda La Cueva (04°36'N, 075°11'W, 3550 m, CZUT 259♂). **Valle del Cauca**, La Florida, Hacienda El Sinaí (03°19'N, 076°11'W, 2900 m, UV 11031♀). **Ecuador: Napo**, El Chaco, Oyacachi, 5

Km al este, confluencia del río Oyacachi con el río Chalpi (00°25'S, 078°00'W, 2550 m, QCAZ 2303♀); **Pichincha**, Piedra Blanca, ladera norte del volcán Rumiñahui (00°34'S, 078°30'W, 4000 m, QCAZ 690 paratype, QCAZ 691♂ paratype); **Tungurahua**, Patate, San Francisco, E of Ambato (01°18'S, 078°30'W, 3000 m, AMNH 67648♀, paratype).

Histiotus colombiae: **Colombia: Boyacá**, Duitama, Páramo de la Rusia entre Peñas Blancas y Peñas Negras (ICN 11169♂); La Uvita (06°19'N, 072°24'W, 2700 m, MLS 1652♀, MLS 1686♂); Paipa, vereda Los Medios, Finca Las Quebraditas (05°49'13"N, 073°07'32"W, 2882 m; IAvH 8596♀, IAvH 8598♀); Paipa, vereda Peña Amarilla, Finca El Aguaco (05°53'13"N, 073°07'17"W, 2964 m; IAvH 8597♀). **Cundinamarca**, Bogotá (04°36'N, 074°05'W, 2600 m, AMNH 75235♂, MLS 797♀, 798♀); Bogotá, barrio Usaquén, La Floresta (04°36'N, 074°05'W, 2600 m, MLS 1536♀); Chipaque, Iglesia de Chipaque (04°26'N, 074°02'W, 2400 m, MLS 1536♀); Choachí, near to Bogotá (BMNH 99.11.4.1 ♀, holotype), Guachetá, Vereda Guachetá Alto, Reserva Forestal Protectora El Robledal (05°27'39.47"N, 073°39'44.57"W, 2893 m, ICN 24845♀, ICN 24846♀, ICN 24847♀, ICN 24848♀); Junín, PNN Chingaza, retén la Paila (04°34'N, 073°41'W, 3100 m, MPUJ-MAMM 228, MPUJ-MAMM 230, MPUJ-MAMM 235).

Histiotus diaphanopterus: **Bolivia: Santa Cruz**, 5.5 km NW of Valle Grande (18°25'S, 64°08'W, 1800 m, AMNH 264086).

Histiotus humboldti: **Colombia: Antioquia**, Urrao, vereda Pabón, Inspección de policía Llano Grande, sitio Rioarriba (2550 m, ICN 12879♂); **Boyacá**, Ráquira, Iglesia de Ráquira (05°32'N, 073°38'W, 2150 m, MHNG 1910.074♀), Sogamoso (ICN 21919♂), Úmbita, vereda Tásvita, parte media quebrada La Gacha, Sector El Infierno (05°12'56"N, 073°30'46"W, 3077m, ICN 24841♂). **Caldas**, Manizales (2150 m, MHN-UCa 261♂), Manizales, sitio casa La Y, Reserva Rio Blanco (2350 m, ICN 15160♂), Manizales, vereda Las Palomas Reserva Hidrográfica Rio Blanco, Fundación Ecológica "Gabriel Arango Restrepo" (2400 m, ICN16975♀, ICN16976♀), Manizales, vereda El Desquite, corregimiento 8, finca La Navarra, Reserva hidrográfica Rio Blanco (3000 m, ICN 16979♂). **Caquetá**, Belén de los Andaquíes, Parque Natural Andakí, Divisoria de aguas (01°43'05"N, 075°54'12"W, 1890 m, ICN 23809♂). **Casana-re**, Chámeza, vereda El Jordán (05°15'59"N, 072°49'13"W, 1400 m, ICN 24842♀, ICN 24843♀), **Cauca**, Cerro Munchique, Hacienda "Mirador" Propiedad Cartón Colombia (2400 m, UV 4397♂), El Tambo, corregimiento San Joaquín (MH-NUC uncataloged [F. J. López 01], Popayán (1700 m, MLS 2571♀, MLS 2581♀, MLS 2570♀, MLS 2580♀), Popayán, El Hogar, Bocatoma (1880 m, MHNUC 1395♀), Totoró, Resguardo Novirao (1720 m, MHNUC 1058♀). **Cesar**, Serranía del Perijá, Municipio Manaure, vereda El Cinco (10°22'17"N, 072°57'15.5"W, ICN 2295♂). **Cundinamarca**, Tenjo, vereda Churuguaco alto, predio Buenavista (04°53'45"N, 074°81'22"W, 3180 m, ICN 24844♂). **Risaralda**, Municipio Santuario, vereda El Campamento (2480 m, ICN 11865♂). **Valle del Cauca**, La Florida, Hacienda los Alpes (2450 m, UV 10847♂, UV 10846♂, UV 10516♀, UV 10845♂, UV 10848♂, UV 10849♀, UV 12069♂), Rio Frio, vereda San Ignacio, corregimiento Fenicia, quebrada El Duende (2500 m, UV 12069♂),

Yotoco, Inspección de Policía Puente Tierra; Reserva Natural de Yotoco Alt: 1700 msnm (1700 m, ICN 21778♀, ICN 21779♀). **Ecuador: Napo**, Sierrazul, 10 Kms S, 10 Km W, Río Aragón (00°05'S, 78°00'W, QCAZ 7601♂).

Histiotus laephotis: **Argentina, Jujuy**, Yuto (AMNH 181527♂, AMNH 181528♂).

Histiotus macrotus: **Chile**, Ñuble, Termas de Chillán (AMNH 238025♀). **Perú**, (MUSM 5257).

Histiotus montanus inambarus: **Perú: Madre de Dios**, Rio Inambari (AMNH 37194).

Histiotus montanus montanus: **Chile, Araucanía**, Cautín, Temuco (AMNH 33253♀, AMNH 33255♀), Malleco, Angol (96 m AMNH 93314♀), Ñuble, Termas de Chillan (AMNH 238027♀); **Biobío**, Arauco, Res. Nahuelbuta, Sur de Concepción (37°47'S, 072°59'W, 1200 m, MHNG 1,744,061♂); Lago Risopatron, Km 240 S. Lago Rosselot (MHNG 1744.60♂). **Uruguay: Canelones**, Jaureguyberry (AMNH 188780♀); **Flores**, Ciudad de Trinidad (AMNH 188781♀); **San José**, Chamizo, Estancia Santa Clara (AMNH 183876♀); **Tacuarembó**, Tacuarembó, 40 Km NW (AMNH 205649♀).

Histiotus sp.: **Perú: Piura**, Talara, Quebrada Pariñas, 9.6 km NE of Talara (AMNH 278521♀).

Histiotus sp.: **Perú: Cajamarca**, Las Ashitas, 4km w of Pachapirana (AMNH 268090).

Histiotus velatus: **Paraguay: Villarica**, Caroveny (AMNH 217565♀). **Perú**: (MUSM 24554, MUSM 39437).

Appendix 2. Descriptions of measurements taken in *Histiotus* specimens.

1. *Total length* (TL): Distance from the tip of the snout to the tip of the last caudal vertebra. Taken from specimen label.
2. *Tail length* (TaL): Measured from the point of dorsal flexure of the tail with the sacrum to the tip of the last caudal vertebra. Taken from specimen label.
3. *Hindfoot length* (HFL): Measured from the anterior edge of the base of the calcar to the tip of the claw of the longest toe. Taken from specimen label.
4. *Ear length* (Ear): Measured from the notch to the fleshy tip of the pinna. Taken from specimen label.
5. *Forearm length* (FA): Taken from the elbow (tip of the olecranon process) to the wrist (including the carpals). This measurement is taken with the wing at least partially folded.
6. *Greatest length of skull* (GLS): Measured from the posteriormost point on the occiput to the anteriormost point on the premaxillae (excluding the incisors).
7. *Condylolincisive length* (CIL): Taken from the posteriormost point on the occipital condyles to the anteriormost point on the upper incisors.
8. *Zygomatic breadth* (ZB): Greatest breadth across the zygomatic arches.
9. *Postorbital breadth* (PO): Least breadth across the frontals, posterior to the postorbital processes or bulges.
10. *Braincase breadth* (BCB): Greatest breadth of the globular part of the braincase
11. *Mastoid breadth* (MB): Greatest cranial breadth across the mastoid region
12. *Braincase height* (BCH): Greatest height of the skull measured between medioventral surface of basioccipital and the highest dorsal point of braincase without include the sagittal crest.
13. *Length of the maxillary tooth row* (MTR): From the anteriormost edge of the canine crown to the posteriormost edge of the crown of M3.
14. *Palatal length* (PAL): Distance between the posterior most point of palatal including the palatal spine and the posterior edge of central incisive alveolus.
15. *Postpalatal length* (PPAL): Distance between the anterior most point of mesopterygoid fossa (without including the palatal spine) and the anterior edge of foramen magnum
16. *Breadth across upper molars* (M-M): Greatest breadth across the outer edges of the crowns of the upper molars.
17. *Breadth across the canines* (C-C): Greatest breadth across the outer edges of the crowns of the upper canines.
18. *Mandibular tooth row* (Dent-L): Greatest distance between anterior most point of dentary and the posterior edge of the condylar process.

Table 1. Genbank and Bold Systems accessions, and voucher numbers used in this study. Museum acronyms in annex 1. LIEB-M Universidad Nacional de la Patagonia San Juan Bosco, Esquel, Chubut, Argentina.

Number	Species	Accession number	Museum voucher	Locality
1	<i>Myotis riparius</i>	JX130571	TTU 102811	Ecuador
2	<i>Eptesicus fuscus fuscus</i>	MF038479	FMNH 214994	USA: Illinois
3	<i>Histiotus colombiae</i>	BBMIH012-19	IAvH 9902	Colombia: Boyacá
4	<i>Histiotus colombiae</i>	BBMIH015-19	IAvH 10013	Colombia: Boyacá
5	<i>Histiotus colombiae</i>	MT113464	ICN 24847	Colombia: Cundinamarca
6	<i>Histiotus colombiae</i>	MT113466	ICN 24846	Colombia: Cundinamarca
7	<i>Histiotus magellanicus</i>	MK429709	LIEB-M 855	Argentina: Chubut
8	<i>Histiotus magellanicus</i>	MK429708	LIEB-M 859	Argentina: Chubut
9	<i>Histiotus magellanicus</i>	MK429710	LIEB-M 860	Argentina: Chubut
10	<i>Histiotus magellanicus</i>	MK429706	LIEB-M 1105	Argentina: Chubut
11	<i>Histiotus magellanicus</i>	MK429707	LIEB-M 1109	Argentina: Chubut
12	<i>Histiotus</i> sp.	MK429704	AMNH 278521	Perú: Piura
13	<i>Histiotus</i> sp.	MK429705	AMNH 278524	Perú: Piura
14	<i>Histiotus humboldti</i>	MT113463	ICN 24841	Colombia: Boyacá
15	<i>Histiotus humboldti</i>	MT113465	ICN 24843	Colombia: Casanare
16	<i>Histiotus humboldti</i>	MT113467	ICN 24844	Colombia: Cundinamarca
17	<i>Histiotus humboldti</i>	MT113462	ICN 23809	Colombia: Caquetá
18	<i>Histiotus macrotus</i>	MK429700	LIEB-M 762	Argentina: Chubut
19	<i>Histiotus macrotus</i>	MK429698	LIEB-M 852	Argentina: Chubut
20	<i>Histiotus macrotus</i>	MK429697	LIEB-M 853	Argentina: Chubut
21	<i>Histiotus macrotus</i>	MK429695	LIEB-M 1100	Argentina: Chubut
22	<i>Histiotus montanus</i>	MK429699	LIEB-M 1113	Argentina: Chubut
23	<i>Histiotus montanus</i>	MK429703	LIEB-M 1115	Argentina: Chubut
24	<i>Histiotus montanus</i>	MK429701	LIEB-M 1116	Argentina: Chubut
25	<i>Histiotus montanus</i>	MK429702	LIEB-M 1117	Argentina: Chubut
26	<i>Histiotus montanus</i>	MK429696	LIEB-M 1118	Argentina: Chubut

Table 2. Comparison among four species of *Histiotus*.

<i>Histiotus humboldti</i>	<i>Histiotus cadenai</i> sp. n.	<i>Histiotus colombiae</i>	<i>Histiotus montanus</i>
Pinnae are triangular with rounded tips and smooth outer edge near to the tip.	Pinnae are triangular with rounded tips and a notch on the outer edge.	Pinnae are ovate. Tips are asymmetric with the two sides unequal. Posterior edge of the pinna with a notch near to the ear tip.	Pinnae are ovate. Tips are asymmetric with the two sides unequal. Posterior edge of the pinna with a notch near to the ear tip.
Tragus eccentric with the principal axe in one side of the middle point of the structure.	Tragus ensiform as a sword form with parallel edges and acute tip.	Tragus ensiform as a sword form with parallel edges and acute tip.	Tragus ensiform as a sword form with parallel edges and acute tip.
Keeled calcar with a lappet.	Keeled calcar without lappet.	Keeled calcar without lappet.	Keeled calcar without lappet.
Braincase and rostrum form an obtuse angle.	Braincase and rostrum form a continuous slope.	Braincase and rostrum form a continuous slope.	Braincase and rostrum form an angle.
No sagittal crest developed, braincase rounded, nuchal crest developed.	Sagittal crest developed a triangular plate of bone at the intersection with the nuchal crests.	Sagittal crest present, a triangular plate of bone at the intersection with the nuchal crests.	Sagittal crest present, a triangular plate of bone at the intersection with the nuchal crests.
Supraorbital region swelled without marked postorbital ridges.	Supraorbital region swollen without marked postorbital ridges.	Supraorbital region swollen with marked postorbital ridges.	Supraorbital region swollen with marked postorbital ridges.
The paraoccipital process is tubular in form and recurved downward.	The paraoccipital process is well developed, wide and blunt.	The paraoccipital process is well developed.	Paraoccipital process very well developed.
Upper premolar without an anterior projection.	Upper premolar without an anterior projection.	Upper premolar with a well-developed anterior projection.	Upper premolar without an anterior projection.
The position of I2 is behind to I1.	The position of I2 is lateral to I1.	The position of I2 is behind to I1.	The position of I2 is behind to I1.
The angular process has a tubular form and projected upward in the same plane of the condylar process.	The angular process has a laminar form and projected outward, outside of the condylar process plane.	The angular process has a laminar form, and projected upward and outside, but in the same plane of the condylar process.	The angular process has a laminar form and projected upward in the same plane of the condylar process.

Table 3. Cytochrome b sequence divergence (%) between and within six *Histiotus* species with p-distance method.

	<i>H. colombiae</i>	<i>H. humboldti</i>	<i>H. macrotus</i>	<i>H. magellanicus</i>	<i>H. montanus</i>	<i>H. sp.</i>
<i>H. colombiae</i>	1.00					
<i>H. humboldti</i>	12.71	1.00				
<i>H. macrotus</i>	12.75	6.46	0.00			
<i>H. magellanicus</i>	11.26	11.39	11.94	0.00		
<i>H. montanus</i>	12.71	6.44	0.18	11.96	0.00	
<i>H. sp.</i>	11.93	3.48	6.67	11.15	6.56	0.00

Table 4. Measurements of different acoustic parameters of *H. montanus montanus* from Chile (Ossa *et al.* 2014) and *H. montanus colombiae* from Cordillera Oriental of Colombia.

	<i>H. m. montanus</i>	<i>H. m. colombiae</i>	Kolmogorov-value	p-Value
N	90	100		
Duration (ms)	3.10 ± 1.1 (0.72-9.65)	5.01 ± 1.3 (2.46-7.55)	0.58842	< 0.005
Interval (ms)	135.80 ± 54.8 (51.66-308.89)	175.23 ± 54.5 (103.02-299.77)	0.31502	< 0.005
Start Frequency (kHz)	46.26 ± 4.4 (37-51.6)	40.96 ± 4.0 (29.31-48.15)	0.53368	< 0.005
End Frequency (kHz)	25.47 ± 1.9 (21.5-31)	20.36 ± 0.8 (18.28-22.41)	0.95895	< 0.005
Peak Frequency (kHz)	32.30 ± 1.8 (24.9-36.1)	26.12 ± 1.7 (22.4-29.24)	0.92789	< 0.005

Data are presented as the mean ± SD, minimum – maximum. N, number of utilized pulses

Table 5. External and craniodental measurements of the type series of *Histiotus cadenai* sp. nov. For acronyms of measurements, see "Appendix 2".

Measurement	*** ICN 16980	** ICN 16981	** UV 13274	** UV 2524	** UV 11031	** QCAZ 2303	** QCAZ 690	** QCAZ 691	** AMNH 67648
Sex	Female	Female	Male	Female	Female	Female	-	Male	Female
TL	110	116	[160]	113	111	-	-	-	-
TaL	50	52	42	47	47	-	-	-	-
HFL	12	10	9	11	9	-	-	-	-
Ear	36	36	[25]	33	31	-	-	-	-
FA	48	47.8	44.98	48.87	46.61	47.64	48	50	-
Weightht	11.25	11.5	10	12	-	-	-	-	-
GLS	17.45	17.17	17.12	17.86	17.73	17.13	18.13	17.95	18
CIL	16.98	16.83	16.43	17.02	16.57	16.39	17.48	17.27	17.08
ZB	10.73	-	10.46	11.11	10.95	10.03	-	11.17	-
PO	4.68	4.5	4.81	4.53	4.68	4.74	4.69	4.95	4.56
BCB	8.14	8.14	8	8.24	8.17	8.18	8.52	8.83	8.35
MB	8.98	8.9	8.86	9.13	8.88	8.92	9.18	9.33	9.15
BCH	5.99	5.89	6.09	5.97	6.16	6.06	6.33	6.08	5.85
MTR	6.57	6.58	6.4	6.2	6.49	6.36	6.94	6.62	6.12
PPAL	7.07	6.94	6.6	6.86	6.55	6.13	6.36	6.69	6.55
PAL	7.76	7.11	7.69	7.64	7.72	7.44	8.78	8.09	7.35
M-M	7.2	6.76	6.88	7.14	7	7.22	7.58	7.58	6.42
C-C	4.88	4.76	4.75	4.82	4.89	4.85	5.24	5.26	4.7
Dent-L	12.17	11.15	11.7	-	11.98	11.82	12.48	11.33	12.05

*** Holotype, ** Paratypes. [] measurements copied from specimen tag but probably erroneous. - No data.