

A HYBRID *AMAZILIA* HUMMINGBIRD FROM HONDURAS

John van Dort^{1,2} · Roselvy Juárez-Jovel^{1,3}

¹SalvaNATURA, 33 av. Sur # 640, Colonia Flor Blanca, San Salvador, El Salvador.

²Current address: Department of Environment and Development Studies, Zamorano University, PO Box 93, Km 30 Road to Danli, San Antonio de Oriente, Honduras.

³Current address: Escuela de Biología, Universidad de Costa Rica, San Pedro, Montes de Oca, Costa Rica.

E-mail: John van Dort · john.vandort@gmail.com

ABSTRACT · We present evidence supporting a hybrid origin of a hummingbird caught in a mist-net in Reserva Biológica Uyuca, Honduras in 2011. Following a defined diagnostic approach, the individual in question showed intermediate characters in terms of plumage and measurements between *Amazilia cyanocephala* and *A. beryllina*, ssp. *devillei*. The hybrid combination of *A. cyanocephala* with the nominate subspecies of *A. beryllina* has been reported once before from Veracruz, Mexico. This is the first time a hybrid of the ssp. *devillei* – whose taxonomic status is uncertain – with *A. cyanocephala* is described.

RESUMEN · Un colibrí híbrido del género *Amazilia* de Honduras

Presentamos evidencia que respalda el origen híbrido de un colibrí capturado en una red de niebla en Reserva Biológica Uyuca en Honduras en 2011. Según un método establecido de diagnóstico, ese individuo mostró caracteres intermedios en términos de plumaje y medidas morfológicas entre *Amazilia cyanocephala* y *A. beryllina*, ssp. *devillei*. La combinación híbrida entre *A. cyanocephala* y la subespecie nominal de *A. beryllina* se ha reportado una vez antes de Veracruz, México. Esta es la primera vez que se describe un híbrido de la ssp. *devillei* – cuyo estado taxonómico es incierto – con *A. cyanocephala*.

KEY WORDS: *Amazilia beryllina* · *Amazilia cyanocephala* · *Amazilia ocai* · Honduras · hummingbird · hybridization

INTRODUCTION

Hybridization has been described in hummingbirds rather more frequently than in most avian families, and in fact many early descriptions of unique specimens showing intermediate characters of two common species were eventually shown to be hybrids (Banks & Johnson 1961). While forty species of hummingbirds occur regularly in Honduras (Fagan & Komar 2016), only one possible hybrid has ever been reported in this family from there. This concerns a specimen collected in 1933 by Underwood in the Honduran department of Cortés, which was initially identified as a Buff-bellied Hummingbird (*Amazilia yucatanensis*) (Monroe 1968), but later reclassified as a probable hybrid between Rufous-tailed Hummingbird (*A. tzacatl*) and Cinnamon Hummingbird (*A. rutila*) (Howell & Webb 1995). Here we present evidence based on morphology and plumage characters to support a case of likely hybridization between two other species of *Amazilia* hummingbirds from Honduras. The taxonomic status of one of the putative parental species remains unresolved; the putative combination here presented has been described once before from Mexico, but from a different parental subspecies.

OBSERVATIONS AND METHODS

On 16 June 2011, an unusually colored hummingbird was caught in a mist-net in Reserva Biológica Uyuca, Honduras, suggesting it might be a hybrid. The hummingbird was encountered during a routine mist-net check at a bird monitoring station located in pine-oak forest at an altitude of 1700 m a.s.l. in Cerro Uyuca (14°02' N; 87°07' W), about 15 km east of Tegucigalpa, Honduras. The station was operated by SalvaNATURA staff for 400 net

Receipt 6 April 2016 · First decision 24 May 2016 · Acceptance 2 December 2016 · Online publication 9 December 2016

Communicated by Joseph Wunderle © The Neotropical Ornithological Society

hours each month between January 2010 and December 2012. Sixteen 12-m nets were distributed within an area of 12 ha. A well-developed shrub layer here supports a sizeable hummingbird community, consisting of five regular resident species. An additional six transient species have been observed at the site (pers. obs.).

Azure-crowned Hummingbird (*Amazilia cyanocephala*), White-eared Hummingbird (*Hylocharis leucotis*), and Green-breasted Mountain-gem (*Lampornis sybillae*) are abundant at the site, although their numbers fluctuate seasonally (Juárez & Komar 2011). For example, from January to December 2010, the project captured 144 Azure-crowned Hummingbirds, but most of them (95%) in April and May. Food plants include the locally common *Triumfetta speciosa* (Malvaceae), found at middle elevations from southern Mexico to Panama (Lay 1950) and *Palicourea padifolia* (Rubiaceae), a hummingbird-pollinated shrub found in middle-elevation cloud forest from southern Mexico to Panama (Taylor 1989). The hybrid likely fed on the latter plant and possibly defended a small feeding territory, because it was caught twice on the same day in the same mist-net, which was surrounded by *P. padifolia*.

Measurements and photos were obtained before the bird was released back into the wild. Measurements were taken with digital calipers (bill and tail rounded off to the nearest 0.1 mm), small wing ruler (unflattened wing cord rounded off to the nearest 0.1 mm), and spring scale (body mass rounded off to nearest 0.5 g). We follow the methodology developed by Graves (1990) for the diagnosis of hummingbirds with unknown taxonomic identity, and for proposing the most likely parent species in case of hybridization. This approach focuses on the identification of apomorphic characters in putative hybrids, and includes limiting the pool of available parent species by taxonomy and geography. Nomenclature follows the taxonomic concept for *Amazilia* by del Hoyo et al. (2014).

RESULTS AND DISCUSSION

Description. Bill medium-sized, straight; maxilla blackish; mandible mostly red, with the distal 30% blackish. Forehead and crown green, with hint of blue; post-ocular spot small, greyish (Figure 1A). Upperparts metallic green to golden green, turning gradually bronzy purple on lower back (rump); uppertail coverts with green outer web and purple inner web (Figure 1B). Wing panel faint cinnamon on base of secondaries (Figure 1C). Chin and throat white with dense green mottling on sides, leaving only a small middle part white; breast mostly metallic green with narrow whitish center, contrasting with whitish belly and golden green flanks. Tibial tufts white, enlarged. Undertail coverts gray with large green centers. Feet blackish, soles whitish gray. Tail a mix of bright purple and bronzy green, with many rectrices showing green outer web and purple inner web (Figure 1D).

Diagnosis and position within the “Emeralds.” There are 65 hummingbird species representing approximately 30 genera present in the study region (Howell & Webb 1995), which can be divided in two subfamilies, the hermits (Phaethornithinae) and the trochilines (Trochilinae). Our individual does not show characters shared by the hermits, such as prolonged, strongly decurved bill, non-iridescent plumage, and elongated central rectrices, and appears to be a trochiline hummingbird. At closer look (Figure 1), it can be identified as member of the “Emerald” clade (cf. McGuire et al. 2014), and representatives of only one trochiline genus – *Amazilia* – share with our individual certain characters regarding length, shape, and color of both bill and tail; all other genera occurring in the region may be excluded on these characters alone. Within *Amazilia*, the following seven species regularly occur in Honduras: White-bellied Emerald (*A. candida*), Honduran Emerald (*A. luciae*), Azure-crowned Hummingbird, Berylline Hummingbird, Blue-tailed Hummingbird (*A. cyanura*), Rufous-tailed Hummingbird, and Cinnamon Hummingbird. An eighth *Amazilia*, the Blue-chested Hummingbird (*A. amabilis*), has been reported in Honduras only from La Mosquitia, several hundred kilometers away (Fagan & Komar 2016), and a ninth and tenth, Steely-vented Hummingbird (*A. saucerottei*) and Buff-bellied Hummingbird (*A. yucatanensis*), have both been recorded as vagrants once in Honduras (eBird 2016). However, based on its unusual combination of characters (see Figure 1) the bird in question cannot be assigned to any of the mentioned species.

Rufous-tailed and Cinnamon Hummingbirds both have mostly red bills and rufous tails, features not shown by our individual. White-bellied and Honduran Emeralds both show dark subterminal bands in their tails, another feature absent in our individual. The rufous flash in the wings is shared by Berylline and Blue-tailed Hummingbirds only; we believe that one of these must represent one parental strain. Blue-tailed Hummingbird can be discarded on the basis of the tail coloration, since blue is completely absent from the bird’s tail. The breast is white with green sides to the breast, as in Azure-crowned Hummingbird, although the white on the breast is much reduced. The hybrid individual was larger than typical individuals of *A. beryllina* ssp. *devillei* but smaller than nominate *A. cyanocephala* (Table 1). In at least four characters, plumage was intermediate in comparison to the putative parental forms (Table 2). This intermediacy suggests that the individual was not an aberrant form of one of the putative parental species. The individual was aged as an adult, based on the absence of striations on the maxillary ramphotheca. We conclude that our individual exhibits a perfect mix of characters from Berylline and Azure-crowned Hummingbirds. The Berylline Hummingbird is a trochiline (‘emerald’) hummingbird with a mostly black bill (lower mandible reddish at base); upperparts green turning purple on the lower back; throat and chest glittering green; belly greyish cinnamon; tail

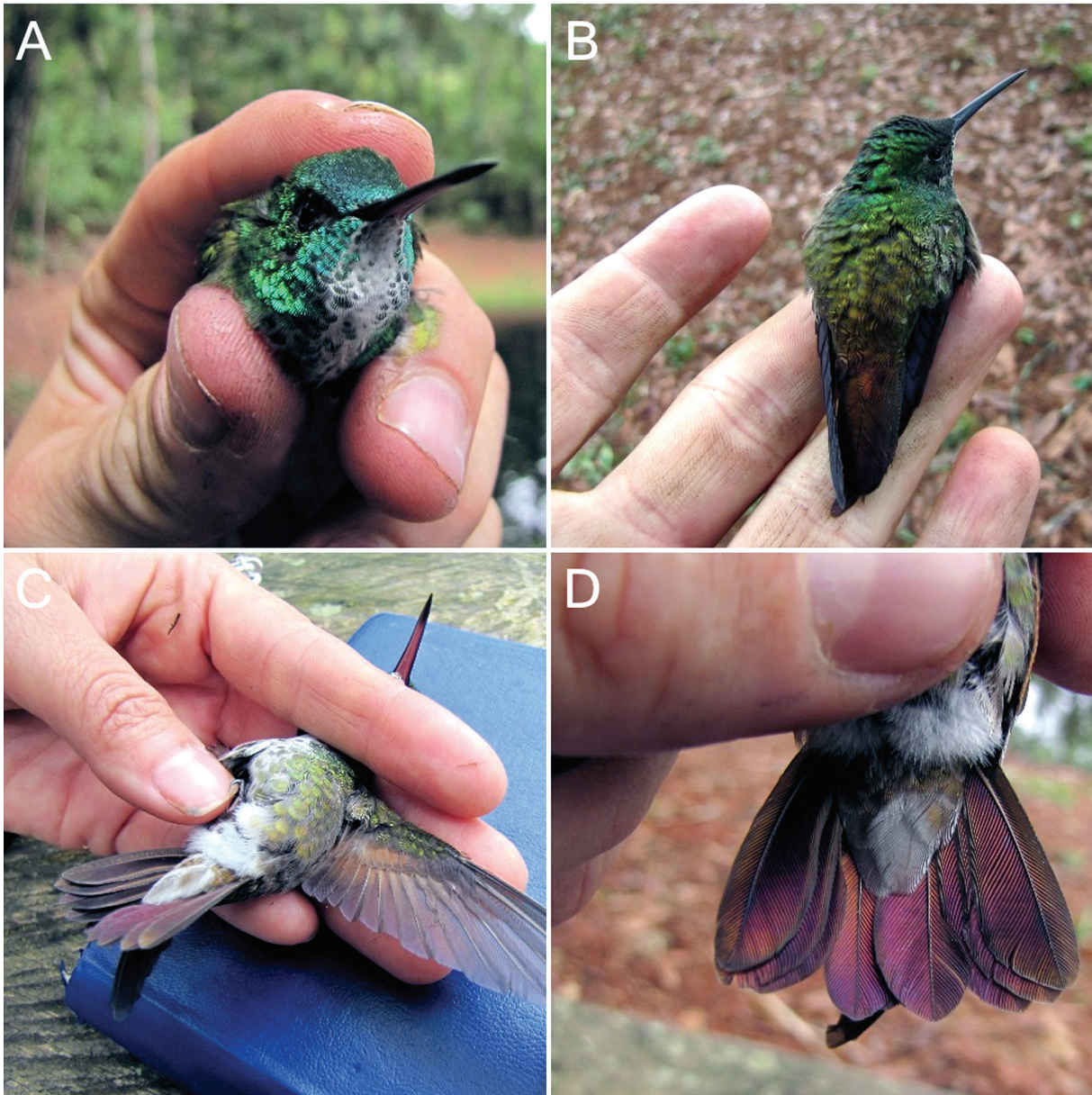


Figure 1. Photographs of hybrid hummingbird (putative *Amazilia cyanocephala* x *A. beryllina* from Honduras): head, crown, and throat (A; top left); upperparts (B; top right); underparts and wing (C; bottom left), and underside tail (D; bottom right). Photos by John van Dort.

and wing bars rufous to cinnamon. The Azure-crowned Hummingbird is a trochiline hummingbird with a mostly black bill (lower mandible reddish at base); azure crown; upperparts green becoming dull brownish on the lower back; throat and chest white bordered by dull green; tail bronzy green.

Howell (1965) first described a green-crowned subspecies of the Azure-crowned Hummingbird from Nicaragua, which he noted is smaller than ssp. *guatemalensis*. Other characters of that subspecies, named *chlorostephana*, do not differ from the nominate group. This form is also found in northeastern Honduras (La Mosquitia) and is sometimes called 'Mosquitia Hummingbird.' While it shares with our individual the green crown and the relatively smaller size (compared to the local subspecies of Azure-crowned), it

does neither show a rufous flash in the wing nor a purple tail. For these reasons we disqualify this subspecies as a likely parental candidate for our bird.

While one of the putative parent species is common at the site, the other has yet to be recorded there. The former, Azure-crowned Hummingbird, is found in pine-oak forests from Mexico through Guatemala and El Salvador, to Honduras and northwestern Nicaragua (Howell & Webb 1995, Martínez-Sánchez et al. 2014). Berylline Hummingbird occurs in Mexico north of the Isthmus of Tehuantepec (*beryllina* group) and south of the isthmus in Chiapas (Mexico), Guatemala, El Salvador, and Honduras (*devillei* group) (Weller 1998, Clements et al. 2015), in oak woodlands of foothills and highlands (Howell & Webb 1995).

Table 1. Comparison of morphometric data between local subspecies of *Amazilia beryllina*, *A. cyanocephala* and the putative hybrids *A. beryllina* x *cyanocephala* from Mexico and Honduras. Measurements for *A. beryllina devillei* and *A. cyanocephala cyanocephala* were obtained from specimens in the Moore Laboratory of Zoology collection. Values are given as means \pm standard deviation (SD). Ranges for each measurement are shown in parenthesis. Measurements for the hybrid “*A. ocai*” from Gould (1859). Gould’s measurements are given in inches, we converted to mm. ¹Based on 6 specimens (3 females, 2 males, and one unsexed; all from Honduras); ²based on 8 specimens (4 females, 4 males; all from Honduras).

Morphometric trait	<i>A. beryllina devillei</i>	<i>A. cyanocephala cyanocephala</i>	“ <i>A. ocai</i> ” Mexico, 1859	<i>A. beryllina</i> x <i>cyanocephala</i> Honduras, 2011
Wing cord	52.4 \pm 1.5 (50.1–54.4) ¹	57.0 \pm 1.8 (56.3–58.6) ²	57.2	55
Tail	26.8 \pm 2.0 (24–29) ¹	34.1 \pm 1.4 (30.8–35.6) ²	34.9	30
Culmen	16.8 \pm 0.8 (15.9–18.3) ¹	20.4 \pm 0.9 (19.2–21.8) ²	22.2	18.5

Table 2. Comparison of main morphological characters between *Amazilia beryllina*, *A. cyanocephala*, “*Amazilia ocai*” from Mexico in 1859 (*sensu* Berlioz 1932), and the hybrid *Amazilia beryllina* x *cyanocephala* from Honduras in 2011.

Body part	<i>A. beryllina</i>	<i>A. cyanocephala</i>	“ <i>Amazilia ocai</i> ” Mexico, 1859	<i>Amazilia beryllina</i> x <i>cyanocephala</i> Honduras, 2011
Crown	Green	Blue	Green-blue	Green, with faint blue tinge
Throat	Green	White	Green on the sides, white in the middle	Green on the sides, white in the middle
Breast	Green	Green on the sides, white in the middle	Not provided	Almost completely green, with very little white in the middle
Tail	Purple/rufous	Green-bronze	Mostly green-bronze, with external rectrices marked pale rufous	Purple, with bronze-green on outer flags, purple on inner flags of rectrices

Comparison with “*Amazilia ocai*.” The combination of Berylline x Azure-crowned Hummingbird has been described only once before, from a specimen collected in Jalapa, Veracruz (Mexico). French ornithologist J. Berlioz encountered this apparent combination in the collection of the British Museum (Berlioz 1932) where it was labeled as *Amazilia ocai* (D’Oca’s Hummingbird), collected by Raphael Montes de Oca of Jalapa, Veracruz (Mexico), and described by Gould (1859). At a time when hybridization among hummingbirds was still relatively unknown, Berlioz recognized that many specimens in collections of species considered extremely rare exhibited intermediate characters of common species, and reassessed some of these specimens as probable hybrids. Gould provides measurements in inches, which we here converted to mm (Table 1). Although we did not examine the British Museum specimen itself, we reviewed Gould’s own morphological description, given in Latin in Gould (1859) and translated to English in Ridgway (1911), and compared both the morphological description of that individual as well as Gould’s painting of it to field notes and photographs of our own individual (Table 2). The following characters do not differ between the putative parental species and our individual: metallic-green upperparts; straight bill with the maxilla blackish and the basal one-third of the mandible flesh-colored. The descriptions in Gould (1859), Ridgway (1911), and Berlioz (1932) coincide with our Honduras 2011 individual, although the

white in the center of the breast was evidently reduced in the British Museum specimen, and did not run completely down the throat to the belly as in the Honduras 2011 individual. Note that in the British Museum specimen, the parental strain of *beryllina* would have been of the nominate subspecies, which does not have a green belly, rather than the *devillei* subspecies, which does. We believe that asymmetric feather coloration on our individual’s uppertail coverts and rectrices (i.e., bronzy-green on the outer side of the rachis and magenta on the inner side) further suggest a hybrid origin (Figure 1). The color of the crown and the color pattern on the throat and breast are also unique characters, shared only with the British Museum specimen. Morphologically, the Honduras 2011 individual shows a mix of characters from the putative parental species *Amazilia beryllina* and *A. cyanocephala*, suggesting its hybrid origin.

Biogeographic and taxonomic considerations. Historically, the Mesoamerican *devillei* group has sometimes been considered specifically distinct from the nominate group in Mexico, and even its placement within *Amazilia* has been questioned, with some authors suggesting it belongs in *Saucerottia* (Ridgway 1911). However, recent phylogenetic work on three closely related *Amazilia* – *beryllina*, *cyanura*, and *saucerottei* – by Jiménez & Ornelas (2016) grouped ssp. *devillei* with *cyanura* rather than *beryllina*, contra Howell & Webb (1995), Weller (1998), Howell (2003),

Clements et al. (2015), and Weller & Kirwan (2016). Moreover, they demonstrated high levels of historical introgression between these three monophyletic taxa, and consider biogeographically central populations between the Isthmus of Tehuantepec and the Nicaraguan Depression to be phenotypically diverse forms of *cyanura*, with western forms approaching *beryllina* and eastern forms approaching *saucerottei* in appearance. We believe our individual to demonstrate intermediate characters between *Amazilia cyanocephala* and *A. beryllina* (*cyanura*?) *devillei*.

The fact that we encountered our putative hybrid near the eastern edge of the distributional range of one of the putative parent species, Berylline Hummingbird, may be significant. Hybridization more often occurs where one or both parent species are rare and thus may have difficulty finding conspecific mates (Banks & Johnson 1961, McCarthy 2006).

Unlike to del Hoyo et al. (2014), recent phylogenetic studies on hummingbirds (e.g., McGuire et al. 2007, 2014) support the view that the current genus *Amazilia* is paraphyletic, with *beryllina* and *cyanocephala* belonging to different, independently evolved species groups within the clade of “Emeralds” (cf. Schuchmann 1999). Given further taxonomic refinement of this critical group of hummingbirds, the observed individual may qualify as an intergeneric hybrid.

ACKNOWLEDGMENTS

We thank Angel Ramos (Zamorano University) for logistical support at the Reserva Uyuca. For funding, we thank U.S. Fish and Wildlife Service and the Centro Zamorano de Biodiversidad. We thank Carla Carcamo, Iris Acosta, and Saíd Laínez at Instituto Nacional de Conservación y Desarrollo Forestal, Áreas Protegidas y Vida Silvestre (ICF) for granting permission to conduct bird monitoring at Uyuca under permit number DE-MP-052-2010, granted to Oliver Komar. We wish to thank Flor Rodríguez and James Maley (Moore Laboratory of Zoology) for providing measurements of MLZ specimens. We thank Kaspar Delhey, Steve N. G. Howell, Oliver Komar, André-A. Weller, Joseph Wunderle, and one anonymous reviewer for commenting on the manuscript.

REFERENCES

Banks, RC, & NK Johnson (1961) A review of North American hybrid hummingbirds. *The Condor* 63: 3–28.

Berlioz, J, (1932) Notes critiques sur quelques Trochilidés du British Museum. *L'Oiseau* 2: 530–534.

Clements, JF, TS Schulenberg, MJ Iliff, D Roberson, TA Fredericks, BL Sullivan & CL Wood (2015) *The eBird/Clements checklist of birds of the world (version 2015)*. Available at <http://www.birds.cornell.edu/clementschecklist/> [Accessed 18 December 2015].

del Hoyo, J, N Collar, DA Christie, A Elliott & LDC Fishpool (2014) *HBW and Birdlife International illustrated checklist of the birds of the world. Volume 1: Non-passerines*. Lynx Edi-

cions, Barcelona, Spain & BirdLife International, Cambridge, UK.

eBird (2016) *eBird: an online database of bird distribution and abundance*. Available at <http://www.ebird.org> [Accessed 17 July 2016].

Fagan, J & O Komar (2016) *Peterson guide to birds of northern Central America*. Houghton Mifflin Harcourt, Boston, Massachusetts, USA.

Gould, J (1859) Descriptions of four new species of hummingbirds from Mexico. *Annals and Magazine of Natural History* 4: 96–98.

Graves, GR (1990) Systematics of the “Green-throated Sunangels” (Aves: Trochilidae): valid taxa or hybrids? *Proceedings of the Biological Society of Washington* 103: 6–25.

Howell, SNG & S Webb (1995) *A guide to the birds of Mexico and northern Central America*. Oxford Univ. Press, Oxford, UK.

Howell, SNG (2003). *Hummingbirds of North America: The photographic guide*. Princeton Univ. Press, Princeton, New Jersey, USA.

Howell, TR (1965) New subspecies of birds from the lowland pine savanna of northeastern Nicaragua. *The Auk* 82: 438–464.

Jiménez, RA & JF Ornelas (2016) Historical and current introgression in a Mesoamerican hummingbird species complex: a biogeographical perspective. *PeerJ* 4: doi 10.7717/peerj.1556.

Juárez, R & O Komar (2011) *Monitoreo permanente de aves en Reserva Biológica Monte Uyuca, Honduras, durante 2010*. SalvaNATURA, San Salvador, El Salvador.

Lay, KK (1950) The American species of *Triumfetta* L. *Annals of the Missouri Botanical Garden* 37: 315–395.

Martínez-Sánchez, JC, L Chavarría-Durieux & FJ Muñoz (2014) *A guide to the birds of Nicaragua*. Westarp Verlagsgesellschaft GmbH, Wittenberg, Germany.

McCarthy, EM (2006) *Handbook of avian hybrids of the world*. Oxford Univ. Press, New York, New York, USA.

McGuire, J, CC Witt, DL Altshuler & JV Remsen Jr (2007) Phylogenetic systematics and biogeography of hummingbirds: Bayesian and maximum-likelihood analysis of partitioned data and selection of an appropriate partitioning strategy. *Systematic Biology* 56: 861–864; doi:10.1080/10635150701656360

McGuire, J, CC Witt, JV Remsen Jr, A Corl, DL Rabosky, DL Altshuler & R Dudley (2014) Molecular phylogenetics and the diversification of hummingbirds. *Current Biology* 24: 1–7.

Monroe, BL (1968) A distributional survey of the birds of Honduras. *Ornithological Monographs* 7: 1–485.

Ridgway, R (1911) The Birds of North and Middle America. Part V. *Bulletin United States National Museum* 50: 1–962.

Schuchmann, KL (1999) Hummingbirds. Pp 468–680 in del Hoyo, J, A Elliott & D Christie (eds). *Handbook of the birds of the world. Volume 5: Barn-owls to hummingbirds*. Lynx Edicions, Barcelona, Spain.

Taylor, CM (1989) Revision of *Palicourea* (Rubiaceae) in Mexico and Central America. *Systematic Botany Monographs* 26: 1–102.

Weller, AA (1998) On types of trochilids in the Natural History Museum, Tring. I. *Amazilia sumichrasti* Salvin, in relation to morphology and biogeography within the *A. beryllina* complex. *Bulletin of the British Ornithologists' Club* 118: 249–256.

Weller, AA & GM Kirwan (2016) Berylline Hummingbird (*Amazilia beryllina*). In del Hoyo, J, A Elliott, J Sargatal, DA Christie & E de Juana (eds). *Handbook of the birds of the world alive*. Lynx Edicions, Barcelona, Spain.

