

## Northernmost record of *Chiroderma trinitatum* (Chiroptera, Phyllostomidae) in Latin America, with distributional comments

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**ABSTRACT.**—We describe the records of two adult males of *Chiroderma trinitatum* captured in the Caribbean lowlands of Ciudad Blanca, Gracias a Dios in eastern Honduras. These records extend more than 527 km from what was known as the northernmost record of this uncommon species in Costa Rica. Further research is needed for the conservation of the biodiversity in the core of the Río Plátano Biosphere Reserve, which includes the historical site Ciudad Blanca. This record represents a new record for the fauna of Honduras, which now comprises 111 bat species.

Among Phyllostomid bats, *Chiroderma* is one of the least studied genera in Honduras, and it consists of six species. One of the largest (body height) is *C. improvisum*, endemic to the Lesser Antilles, including Guadalupe and Monserrat. Two species are unique to South America: *C. vizottoi* to Brazil, and *C. doriae* endemic to Brazil and Paraguay. Species with the widest distribution are *C. salvini* and *C. villosum*, found from Mexico to Bolivia. The smallest in body height is *C. trinitatum*, and it was known from Costa Rica, Brazil, Guianas, Suriname, Bolivia, Ecuador, Peru, Venezuela, and Trinidad and Tobago (Baker et al. 1994; Simmons 2005; Reid 2009; Taddei and Lim 2010). Goodwin (1958) refers to the type locality of *C. trinitatum* (= *Chiroderma trinitatus*) as Trinidad and Tobago (previously known as British West Indies). He recognized it as a species easy to identify because of their tiny size (e.g. forearm less than 41 mm), and their upper incisors being relatively smaller in comparison with other species, for example *C. salvini*.

Goodwin (1942) recorded one of the first records in Honduras of *C. salvini* in Tegucigalpa, Francisco Morazán. Posteriorly, McCarthy et al. (1993) mentioned some historical records of *C. villosum* for the departments of Atlántida, Choluteca, Intibucá, Valle, Francisco Morazán, and Olancho. Despite the insufficient information in other parts of America, their specialization on wild figs (*Ficus*) has been studied (Nogueira and Peracchi 2003).

Here, we provide a morphological, ecological, and geographical description of the northernmost record of *C. trinitatum* based on two specimens recorded by Medina-Fitoria and Turcios-Casco (2019) in a Rapid Ecological Assessment (RAP) in the historic city of Ciudad Blanca, Gracias a Dios, in eastern Honduras. Ciudad Blanca is an archaeological and pre-Columbian site (Preston 2017) which was recently discovered, and is part of the core of the Río Plátano Biosphere Reserve. The pristine forest represented in the study area (Fig. 1) is a Tropical Moist Forest in the Caribbean lowlands of Honduras. Precipitation oscillates from 1600 to 1800 mm annually, and the annual temperature average is 20–26° C (Holdridge 1967; Herlihy 1997; Martínez 2014). Predominant vegetation includes *Cedrela odorata*, *Ceiba pentandra*, *Ficus* spp., and other native plants of the families Fabaceae, Gesneriaceae, Malvaceae, Poaceae, and Urticaceae.

### MATERIALS AND METHODS

We captured bats with mist nets of standard measurement (12 × 2.5 m) with a mesh of 35 mm from February 14 to 24, 2017. Mist nets were opened from 18:00 to 22:00. We followed Kunz and Kurta (1988) for the position and the sites of mist nets, and they were placed based on the body of waters, vegetation, and topography. For taxonomical identification, we followed Timm et al. (1999), Medellín et al. (2008), and Medi-

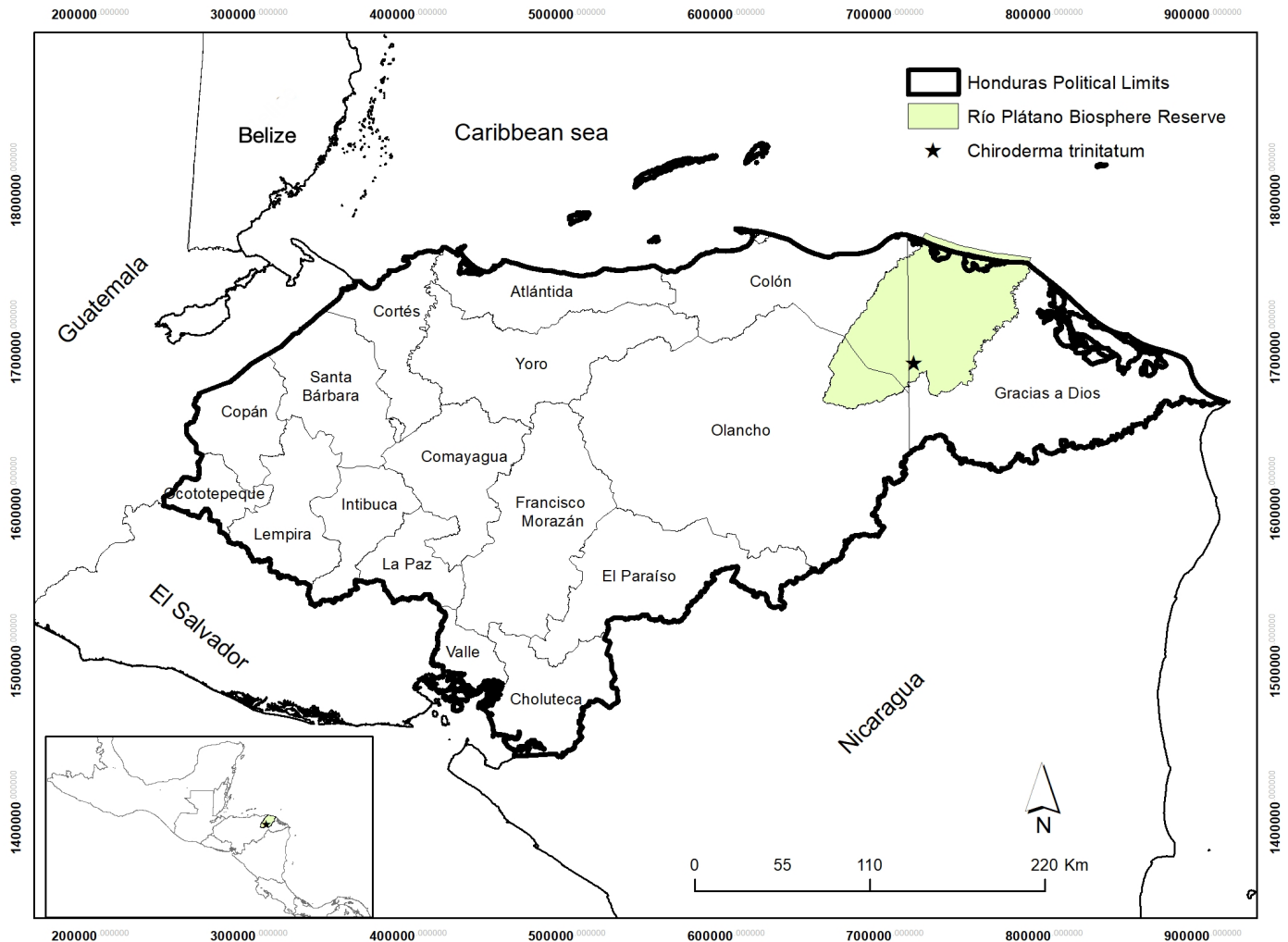


FIG. 1. Record of *Chiroderma trinitatum* in the Caribbean lowlands of eastern Honduras. The site is known as Ciudad Blanca, in the department of Gracias a Dios. The ecosystem represented is a Tropical Moist Forest based on Holdridge (1967).

na-Fitoria (2014). We followed Kunz et al. (1996) for sex and biological age determination. A description of the teeth and the fur was made while specimens were still alive. A vernier caliper with spire Mitutoyo (506-675) was used for the external measurements to the nearest 0.01 mm. A pesola scale of 30 g was used for weighing body mass of the bats. For each capture hour, relative air humidity and temperature were taken with a standard thermometer.

One of the two individuals was sacrificed according to ethical guidelines of the use of mammals in wildlife research (Sikes et al. 2016) and was preserved in liquids based on conventional methods of Rabinowitz et al. (2000) and Kingston (2016). We deposited the specimen of *C. trinitatum* with the registration code UVS-V-02529 in the collection of the Museum Biodi-

versidad y Ciencia of the National Autonomous University of Honduras in the Sula Valley (UNAH-VS), Cortés, in northwestern Honduras.

## RESULTS

On February 14, two individuals of *C. trinitatum* were captured in 20 hours/mist-nets for sampling night. Both adult males were captured (UTM: 718135, 1686533; 250 m) at 300 meters from the basecamp, and 20 meters from an unnamed river. Individuals were captured between 18:15 and 19:15, while air temperature and relative humidity, respectively, oscillated between 20.5 and 22° C, and between 91.0 and 95.0 %. In the same night, we recorded individuals (including vocalizations) of *Carollia sowelli*, *C. castanea*, *C. perspicil-*

TABLE 1. Morphological comparison between the second male captured in Ciudad Blanca and other specimens recorded in Latin America. A dash (-) indicates that the information was not given in that publication. All measurements except for Body mass (g) are in mm.

	Goodwin (1958)	Baker and Genoways (1976)	Reid (2009)	Taddei and Lim (2010)	Terra Garbino et al. (2012)	This study
Sex	♀	♀♀	General	♀♀	♀♀	♂
Forearm length	40.50	39.40– 41.80	38.00– 41.00	39.40– 41.80	37.70– 37.99	34.66–36.00
Length of the first phalange of the third finger	–	–	–	–	12.97– 13.51	13.13
Length of the second phalange of the third finger	–	–	–	–	19.56– 19.94	19.80
Body height	57.50	55.00– 69.00	52.00– 70.00	55.00– 69.00	–	44.40
Ear length	14.20	16.00– 18.00	13.00– 18.00	16.00– 18.00	–	12.10
Tragus length	5.50	6.00–7.00	–	–	–	5.11
Hindfoot length	12.50	11.00– 12.00	9.00–12.00	–	–	9.67
Tibia length	16.50	–	–	–	–	13.22
Body mass (g)	–	–	12.00– 14.00	–	–	13.00



FIG. 2. Adult male of *Chiroderma trinitatum* with conspicuous white stripes in the face. The individual was captured in Ciudad Blanca, Gracias a Dios, Honduras. Photo by MATC.

*lata*, *Glossophaga commissarisi*, *Dermanura watsoni*, *Artibeus jamaicensis*, and *A. lituratus*. No external parasites or pollen were observed in their fur. While manipulated, neither shrieked or excreted, nor had any anomaly or were in a reproductive state, but they tried to bite and urinated. The first individual escaped after the forearm length (36.00 mm) and body mass (13.00 g) were taken.

The next description (Table 1) is based on the second individual while still alive: forearm length: 34.66 mm; femur length: 17.00 mm, tibia length: 13.22 mm; noseleaf length: 10.16 mm; noseleaf width: 5.01 mm; ear length: 12.10 mm; ear width: 8.46 mm; thumb length: 5.23 mm; tragus length: 5.11 mm; tragus width: 2.06 mm, calcaneus length: 4.80 mm; body height: 44.40 mm; hindfoot height: 9.67 mm; wingspan: 282.80 mm; third metacarpal length: 34.68 mm; length of the first phalange of the third finger: 13.13 mm; length of the second phalange of the third finger:

19.80 mm; length of the third phalange of the third finger: 13.23 mm; humerus length: 18.35 mm; body mass: 14.00 g. Facial lines were white and conspicuous (Fig. 2). The dorsal area was brownish-gray with a conspicuous white mid-dorsal line, and two hair bands: brown (basal) and brownish-gray. The frosty ventral area was brownish-gray with indistinct hair bands. Large protector hairs (> 2 mm) covered the dorsal area of the uropatagium.

The following incisors and canines description (Fig. 3) coincides with the ones done by Goodwin (1958) and Terra Garbino et al. (2012): upper external incisors relatively smaller than internals and conic; upper internal incisors slightly bicuspid and thin, and are positioned obliquely toward teeth row and approximately three times bigger than upper external incisors, converging with the third distal part of the tip; lower internal incisors rounded and separately by a uniform space; and upper and lower canines approximately double in size of the upper internal incisor.

In agreement with Loayza et al. (2006), Flores-Saldaña (2008), Suárez-Villota et al. (2009), and Durán and Pérez (2015), we recorded (including vocalizations) individuals of the following species: *Saccopteryx bilineata*, *Desmodus rotundus*, *Tonatia saurophila*, *Chrotopterus auritus*, *Carollia sowelli*, *C. castanea*, *C. perspicillata*, *Uroderma convexum*, *Vampyressa thuyone*, *Artibeus jamaicensis*, *A. lituratus*, and *Myotis riparius*. In contrast with them, this is the first time this species is recorded with *Rhynchonycteris naso*, *Noctilio albiventris*, *Pteronotus mesoamericanus*, *Micronycteris hirsuta*, *M. microtis*, *Lophostoma brasiliense*, *Phyllostoma stenops*, *Phyllostoma discolor*, *Glossophaga commissarisi*, *Hylonycteris underwoodi*, *Platyrrhinus*



FIG. 3. Drawing of the teeth of specimen UVS-V-02529. Notice how the third distal part of the tip of the upper incisors is converged. Not to scale.



*helleri*, *Dermanura phaeotis*, *D. watsoni*, *Thyroptera tricolor*, *Myotis nigricans*, *Rhogeessa tumida*, and *Molossus molossus*.

#### DISCUSSION

In Bolivia, *C. trinitatum* has been recorded in mountainous forests: 1400–1700 m (Loayza et al. 2006), riverside forests, and transitional cloudy forests: 250–1050 m (Flores-Saldaña 2008). In Brazil, it has been recorded in forests in the Amazonia (Terra Garbino et al. 2012). In Colombia it has been recorded in tropical dry forests: 300 m (Durán and Pérez 2015), and secondary tropical humid forests, pasturelands and plantations: 55 m asl (Suárez-Villota et al. 2009). *Chiroderma trinitatum* has demonstrated its distribution in a peculiar variety of ecosystems including near and above bodies of water. Loayza et al. (2006) and Reid (2009) mentioned that *C. trinitatum* flies in the canopy and sub-canopy and is not frequently caught by mist nets. Additionally, in the last decade it has been recorded in places where air temperature oscillates between 27 and 28° C in humid places, between 1200 and 2000 mm annually (Suárez-Villota et al. 2009).

The records from southern Central America are in the Atlantic versant of Costa Rica and Panama (Baker et al. 1994; Timm et al. 1999; LaVal and Rodríguez Herrera. 2002; Simmons 2005; Miller et al. 2016). For northern Central America, the occurrence of *C. trinitatum* was expected for the Atlantic versant (> 1000 m) of Nicaragua (Medina-Fitoria 2014), but not for Honduras. In this way, these unexpected records represent the first ones for northern Central America (El Salvador, Nicaragua, Honduras, Guatemala, and Belize), and extend more than 527 km from what was known as the northernmost record from Tortuguero, Costa Rica (Timm et al. 1999; LaVal and Rodríguez Herrera. 2002; Reid 2009; Miller et al. 2016).

Essentially, more sampling is needed on this region of Central America for the determination of the distribution of *C. trinitatum*. The conservation of Ciudad Blanca is supported by the fact that it is an anthropological area discovered recently, in which no human communities are found in the core. However, deforestation and fires for extensive raising of livestock and agriculture are evidence that human communities are constantly migrating from the buffer zone to the core of the

Río Plátano Biosphere Reserve. *Chiroderma trinitatum* represents an addition to the list of bat species in Honduras that remains controversial (Turcios-Casco and Medina Fitoria 2019). Also, little scientific research has been conducted in Ciudad Blanca recently, and little is known about the area. The effective application of conservation plans in the foreseeable future not for the site, but the species, is fundamental. We encourage government entities of Honduras and Nicaragua to strengthen conservation strategies at a landscape scale, considering that this new record was found in a Tropical Moist Forest shared with Nicaragua, and *C. trinitatum* was expected for Nicaragua. Finally, if we considered the number of bat species in Honduras mentioned by Mora et al. (2018), the addition of *C. trinitatum* to the fauna of Honduras make a total of 111 bat species in Honduras.

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