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Dental anomaly in the yellow-shouldered bat, *Sturnira lilium*

Anomalía dental en el murciélago de hombros amarillos, *Sturnira lilium*

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Abnormal dental formulas occur frequently in natural populations. Numerous cases of dental anomalies have been reported for many groups of mammals, and bats are the group with most dental anomalies among mammals. Here we describe the occurrence of a diastema in the position of the upper incisors in an individual of *Sturnira lilium* collected in southern Brazil. This is the first record of a diastema for the species. The dental anomaly reported here may be an isolated case present in this one individual, and without a permanent presence in the population since no other specimens with this type of anomaly were found in the region.

Keywords: Anomaly; Brazil; Chiroptera; Neotropical mammals; skull of bats.

Las fórmulas dentales anormales ocurren con frecuencia en poblaciones naturales. Se han reportado numerosos casos de anomalías dentales para muchos grupos de mamíferos, y los murciélagos son el grupo con la mayoría de las anomalías dentales entre los mamíferos. Aquí describimos la aparición de un diastema en la posición de los incisivos superiores en un individuo de *Sturnira lilium* recolectado en el sur de Brasil. Este es el primer registro de un diastema para la especie. La anomalía dental reportada aquí puede ser un caso aislado presente en este individuo, y sin una presencia permanente en la población ya que no se encontraron otros especímenes con este tipo de anomalía en la región.

Palabras clave: Anomalía; Brasil; Chiroptera; cráneo de murciélago; mamíferos neotropicales.

Mammalian teeth are similar in basic components, they exhibit great diversity in number, size, and shape, and they have much to contribute to the study of ecology, paleontology, functional morphology, and systematics. Dental formulas are widely used in taxonomy studies for the diagnosis of mammalian genera and species (Bergqvist 2003). However, abnormal dental formulas occur frequently in natural populations. Numerous cases of dental anomalies have been reported for many groups of mammals (Azorit *et al.* 2002; Martin 2007; Loch *et al.* 2010; Libardi and Percequillo 2014), and bats are the group with most dental anomalies among mammals (López-Aguirre 2014; Esquivel-Melo *et al.* 2017). In bats, different types of cranial anomalies involving dental formulas may occur. These anomalies are usually related to numerical, morphological, positional, occlusion, or eruption of teeth (Hoff and Hoff 1996). At the Neotropic, the frugivorous bat *Artibeus lituratus* (Phyllostomidae) is the bat species with the highest number of records of dental anomalies. According to López-Aguirre (2014), after deep bibliographical research, compiled data from the last 50 years, the list of bat species with cases of dental anomalies rise to 64 species.

Among frugivorous phyllostomids, bats of the genus *Sturnira* have the largest number of known species. The genus includes at least 23 monophyletic clades of frugivorous bats that are all endemic to the Neotropics (Velazco and Patterson 2013). The diversity of *Sturnira* has grown substantially from recent revision studies (Velazco and Patterson 2013). It has a broad distribution and occurs from México to northern Argentina, including the Lesser Antilles (Simmons 2005; Velazco and Patterson 2013).

The yellow-shouldered bat, *Sturnira lilium* (Chiroptera, Phyllostomidae) is a widespread species and often represents one of the most abundant frugivorous bat in neotropical communities (Simmons 2005; Velazco and Patterson 2013). The yellow-shouldered bat is an intermediate-sized species, with an average weight of 21 g and forearm length measuring about 41 mm (Gannon *et al.* 1989; Gardner 2008; Reis *et al.* 2017). Like most species of *Sturnira*, *S. lilium* has a dental formula of I2/2, C1/1, P2/2, M3/3 = 32 teeth. The internal upper incisors are sickle-shaped, the upper molars have a longitudinal notch and poorly developed cusps, and the second lower molar has prominent parallel and prominent longitudinal notch (Gardner 2008). Here we describe the occurrence of a diastema in the position of the upper incisors in an individual of *S. lilium* collected in southern Brazil.

The specimen was collected in a fragment of mixed ombrophilous forest (MOF) of about 20 ha located in Chapecó, Santa Catarina, southern Brazil (27º 05'S, 52º 39'W; Figure 1). It was captured using mist nets (9 x 3 m), disposed at 0.5 meters from the ground and preserved as dry skin and skull in the Coleção de Mamíferos da Universidade Comunitária da Região de Chapecó, Chapecó, Brazil (CMUC0133). All handling procedures and field activity were approved by the Animal Use Ethics Committee of the Universidade Comunitária da Região de Chapecó (CEUA-Unochapecó, protocol 006/17). The study area is situated in a transition between MOF and seasonal deciduous forest (SDF). MOF has a complex structure and several types of plant communities within its distribution, with *Araucaria angustifolia* (Bertol.) Kuntze as dominant species. SDF comprises forests characterized by the predominance of deciduous trees, with more than 50 % of plant species shedding all their leaves during unfavorable seasons (Gasper *et al.* 2013).

The specimen with a diastema is an adult male (weight 23 g, 43.62 mm, body length 50.63 mm, ear 12.84 mm, and leaf height of 8.18 mm), collected by Fernanda W. Oliveira and Denyelle H. Corá on 5 January 2018 (Figure 2). Fifteen skull measurements were taken from the specimen (for more details see Moratelli *et al.* 2011). All measurements were taken using a digital caliper (0.01 millimeters). Selected cranial measurements (in millimeters) of CMUC0133 were: greatest length of skull (GLS) = 23.7; condylo-canine length (CCL) = 18.12; condylo-incisive length (CIL) = 18.66; basal length (BL) = 19.80; zygomatic breadth (ZB) = 14.03; mastoid breadth (MAB) = 12.70; braincase breadth (BCB) = 10.92; inter-orbital breadth (IOB) = 6.70; postorbital breadth (POB) = 6.41; breadth across canines (BAC) = 6.08; breadth across molars (BAM) = 8.10; maxillary tooth row length (MTL) = 6.96; molariform tooth row length (M3) = 3.27; mandibular length (MAL) = 15.02; mandibular toothrow length (MAN) = 7.70. We compared the skin and dentition of this specimen (CMUC0133) with other 63 individuals of the same species collected in the same fragment and nearby populations. From all analyzed specimens, CMUC0133 matches the description of *S. lilium* and fits the morphological pattern, except for the anomaly here described (Figure 2). The identification of morphological diagnostics characters was based on Giannini and Barquez (2003) and Reis *et al.* (2017).

Although it is relatively easy to distinguish among some species of *Sturnira*, there is considerable intraspecific variation in color, size, and skull shape. Additionally, multilocus molecular analyses of the genus showed *S. lilium* to be a paraphyletic complex of species, including new species (Velazco and Patterson 2013). However, most authors (Davis 1980; Iudica 2000) agree that the dentition provides some of the most consistent characters for the primary bases for

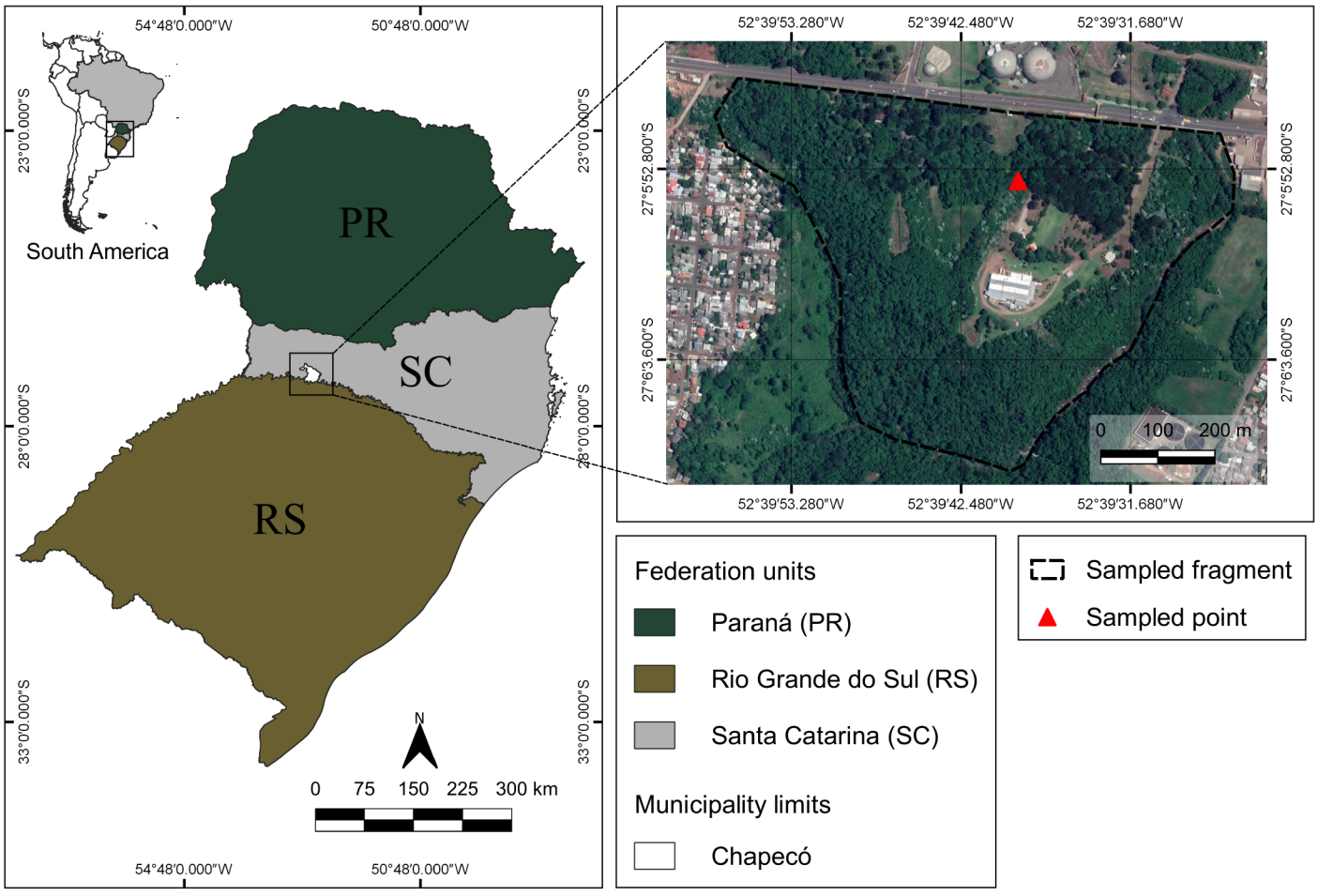

Figure 1. Location of the study area in Chapecó, Santa Catarina, southern Brazil.

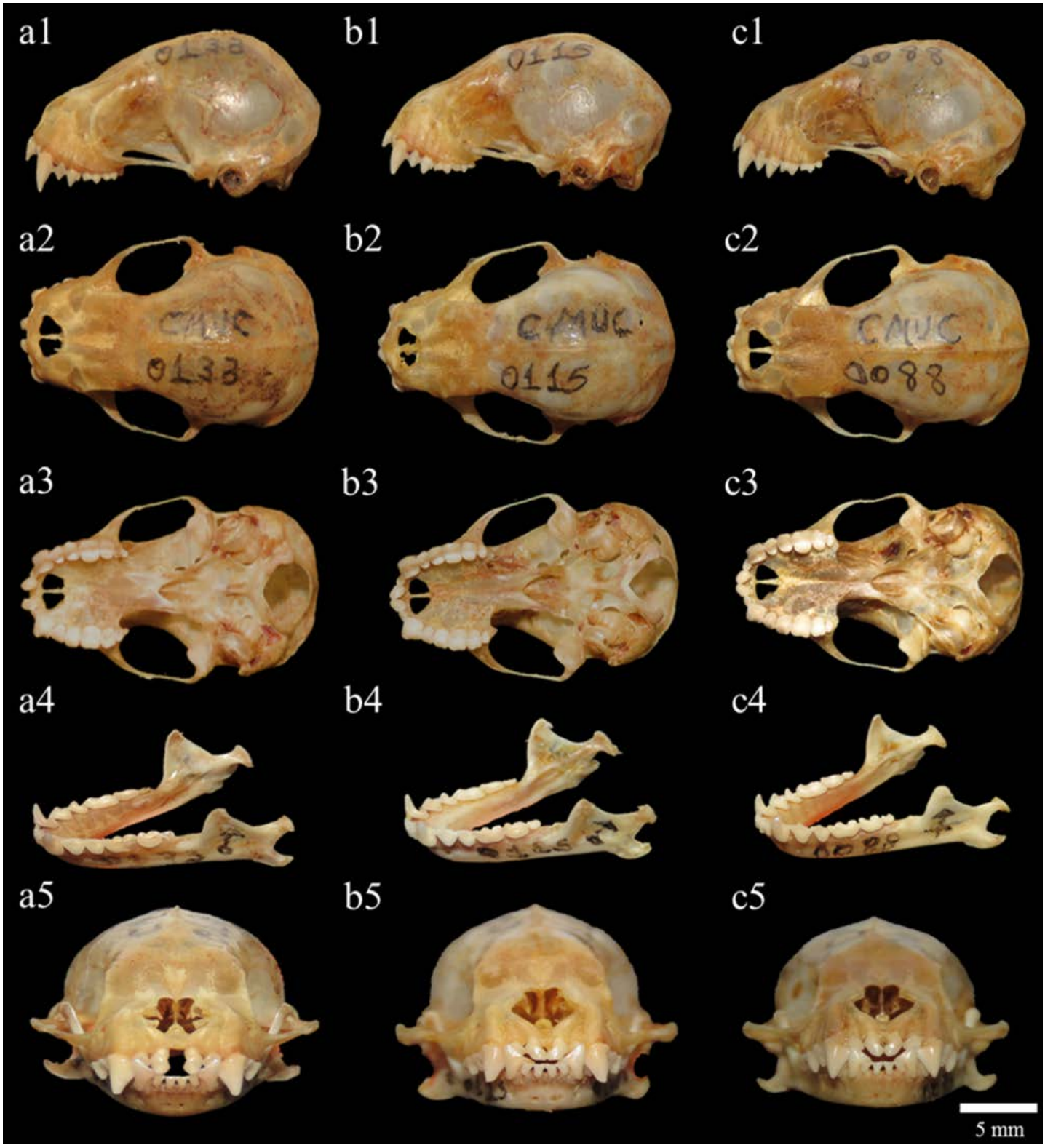

Figure 2. Lateral (a1-c1), dorsal (a2-c2) and ventral (a3-c3) views of the skulls; lateral view of the mandibles (a4-c4); and frontal view of the skulls (a5-c5) from individuals of *Sturnira lilium* collected in Chapecó, Santa Catarina state, southern Brazil. a1-a5: *Sturnira lilium* adult male CMUC0133 with the presence of the diastema. Skulls from other two individuals of *S. lilium* are also displayed (CMUC0115: adult male – b1-b5; and CMUC0088: adult female – c1-c5, respectively). The scale bar (in white) represents 5 mm.

separation of species (Davis 1980; Giannini and Barquez 2003). To our knowledge, from all recognized species of *Sturnira*, there is no record in the literature of a diastema between the upper incisors to the moment, although diastemas might occur naturally in some species of insectivorous, frugivorous and nectarivorous bats (Reis *et al.* 2017).

The causes of dental anomalies reported in bats have been attributed to multiple causes, including genetic, nutritional, pathogenic, or developmental disorders (Hoff and Hoff 1996). Cranial anomalies in bats are mainly recorded for variation in the number of teeth (Rui and Drehmer 2004; López-Aguirre 2014; Esquivel-Melo *et al.* 2017), and pheno-

typic plasticity regarding the abnormal variation in teeth spacing of the upper incisors is little known. The dental anomaly reported here may be an isolated case present in this one individual, and without a permanent presence in the population since no other specimens with this type of anomaly were found in the region. The collection and preparation of specimens with similar characteristics are essential to help understand the possible processes involved in such anomalies.

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