NOTAS SOBRE

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Bilateral agenesis of M3 in the little yellow-shouldered bat, *Sturnira lilium* (Chiroptera: Phyllostomidae)

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ABSTRACT
Dental anomalies are common in mammals, especially bats, but are still a poorly understood phenomenon. Since mammal taxonomy typically relies on dental formulas, unnoticed dental anomalies could lead to species misidentification. Here, we describe the first case of hypodontia (i.e., the congenital absence of teeth) in the common yellow-shouldered bat, *Sturnira lilium.*

Keywords: dental anomalies, hypodontia, Phyllostomidae, taxonomy, teeth

RESUMO – Agênese bilateral do M3 no morcego *Sturnira lilium* (Chiroptera: Phyllostomidae).
Anomalias dentárias são comuns em mamíferos, especialmente morcegos, mas continuam sendo um fenômeno mal compreendido. Uma vez que a taxonomia de mamíferos recorrentemente se vale de fórmulas dentárias, anormalidades dentárias inadvertidas podem levar à identificação incorreta das espécies. Aqui, descrevemos o primeiro caso de hipodontia (i.e., a ausência congênita de dentes) no morcego-pequeno-de-ombros-amarelos, *Sturnira lilium.*

Palavras-chave: anomalias dentárias, dentes, hipodontia, Phyllostomidae, taxonomia

The emergence of heterodont dentition was a key feature in the evolutionary success of mammals (Clemens 1970; Yamanaka et al. 2015). Changes not only in the number of teeth but also in their size and shape are related to the diversification of diets and life history traits in this group (Butler 2000; Smith & Coates, 2000). For this reason, dental morphology can be used to predict a species' ecology, besides being useful for mammal taxonomy (Cuozzo & Sauther 2012). Dental anomalies are known to occur in several orders of mammals, and its origin has been related to factors such

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as environmental instability (Chemisquy & Martin 2016), limited gene flow (Martin 2013), atavisms (Hall 2010), or even aleatory mutations (Hauer 2002). At least for bats, the phylogenetic structure in the occurrence of dental anomalies indicates that some shared processes among related species are also influencing the phenomenon (Esquivel et al. 2021). The main types of dental anomalies described for the order Chiroptera are hypodontia (the absence of teeth), and polyodontia (the presence of supernumerary teeth) (Esquivel et al. 2021). The etiologies of these abnormal morphologies, however, are not fully comprehended.

Dental formulas are commonly used as diagnostic characters for several mammal species (Gardner 2008). Due to this usage, anomalies in the number of teeth may result in the misidentification of individuals (Rui & Drehmer 2004; Martínez-Arias et al. 2010). The objective of this communication is to describe the first observation of M3 hypodontia in the little yellow-shouldered bat, *Sturnira lilium* (É. Geoffroy St.-Hilaire, 1810).

During the examination of a series of bats of the genus *Sturnira* Gray, 1842 from South America deposited in different zoological collections (373 specimens; 213 specimens of *S. lilium* including 38 specimens from the same locality; see Appendix 1), we found an abnormal specimen of *S. lilium* with the dental formula: I2/2, C1/1, P2/2, M2/3 x2 = 30. This arrangement differs from the condition known for the species (I2/2, C1/1, P2/2, M3/3 x2 = 32; Fig. 1), which is the same for *S. tildae* De la Torre, 1959, *S. giannae* Velazco and Patterson, 2019, and *S. magna* De la Torre, 1966, other species examined in our sample. The absence of the M3 alveolus (Fig. 1) indicates that the tooth was not lost during the individual's life or in the collection. The specimen (ALP 3833) is an adult female collected in the Reserva Natural Vale (municipality of Linhares, state of Espírito Santo, southeastern Brazil, latitude -19.115000; longitude -39.938889) by Adriano L. Peracchi, Sila T. Albuquerque and Onézimo F. Fraga on June 4, 1981.

Despite the absence of the third molar of the maxilla, the specimen does not present any other abnormality, and completely agrees with the identification characters proposed by Carneiro et al. (2022) for *S. lilium* in the Atlantic Forest, as the presence of a deep notch between entoconid and metaconid on m1 and m2, and the absence of the lingual shelf in M1 and M2. The incidence of dental anomalies in our sample of *S. lilium* was 0.46%, and 0.27% in our sample of *Sturnira* species. External measurements (mm) and body mass data available for this specimen are as follows: total length, 55; forearm length, 41.5; foot length, 12.1; ear length, 14.2; body mass, 17.2 g. We also recorded selected cranial and mandibular measurements, as indicated by Nogueira et al. (2012) for the abnormal specimen (n=1), and for all other *S. lilium* females from Atlantic Forest in our sample (n=45). With the exception of maxillary toothrow length and mastoid breadth, all measurements fall within those taken for *S. lilium* from the Atlantic Forest (Table 1).

Liposki-Biassi et al. (2020) reported one *S. lilium* with an abnormal diastema between the maxillary central incisors, but this is the first report of a numeric dental anomaly in this species. In *Sturnira*, numeric dental anomalies related to the third

lower molar are known only for *Sturnira ludovici* Anthony, 1924 (hypodontia—Martínez-Arias et al. 2010). In this case, the dental anomaly resulted in the identification of a specimen of *S. ludovici* lacking the m3 as *Sturnira thomasi* De la Torre & Schwartz 1966 (in which the presence of m3 is variable; Jones Jr & Genoways 1975) within continental Colombia (Martínez-Arias et al. 2010). Authors should be aware of the occurrence of dental anomalies in bats, as this is a common phenomenon (with a frequency of 4.65%) within this group (Esquivel et al. 2021), and it can lead to species misidentifications (Martínez-Arias et al. 2010).

There is a noticeable trend of decreasing numbers in the publication of anecdotal reports (Ramsay & Teichroeb 2019). Authors should be encouraged to report morphological anomalies, as this trend hinders the dissemination of peer-reviewed materials on phenomena such as dental anomalies. These anomalies often go unnoticed and remain poorly understood (Esquivel et al. 2021), limiting our capacity to comprehend these occurrences and further our understanding.

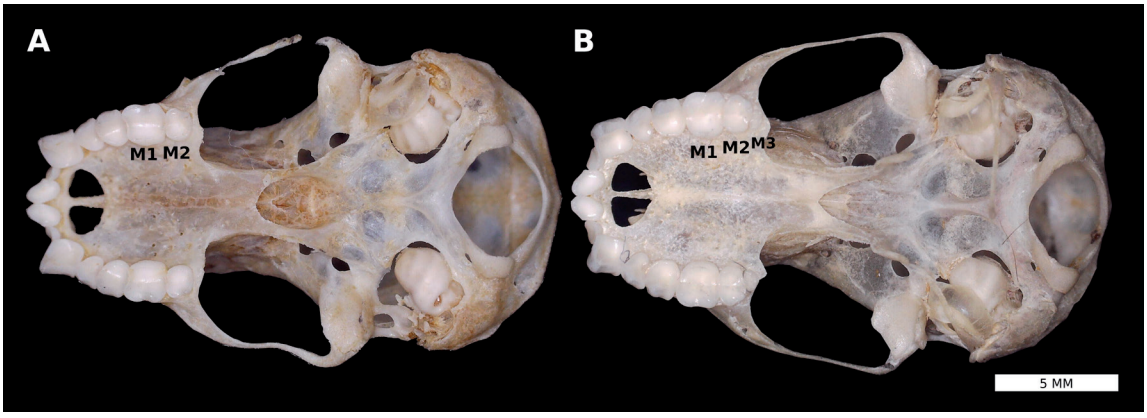

Figure 1. A) Ventral view of skull of specimen ALP 3833 (affected by agenesis of M3); B) Ventral view of skull of specimen UENFMZ 072 (as reference).

Table 1. Selected cranial and mandibular measurements for the abnormal specimen (n=1) and for all other *S. lilium* (females) from Atlantic Forest in our sample (n=45) (average (SD; range)).

	ALP 3833	**Reference sample**
Greatest length of skull	21.54	22.23 (0.40; 21.46–23.27)
Condyloincisive length	19.78	20.02 (0.42; 19.10–20.96)
Condylocanine length	19.29	19.55 (0.35; 18.80–20.27)
Postorbital breadth	5.59	5.93 (0.21; 5.51–6.42)
Braincase breadth	9.97	10.13 (0.29; 9.38–10.66)
Mastoid breadth	10.13	12.11 (0.25; 11.74–12.83)
Length of maxillary toothrow	6.27	6.60 (0.18; 6.30–7.6)
Breadth across molars	8.06	8.06 (0.21; 7.68–8.51)
Breadth across canines	6.06	5.93 (0.24; 5.47–6.42)
Length of upper canines	2.49	2.60 (0.13; 2.31–2.79)
Mandibular length	14.77	14.62 (0.31; 13.89–15.31)
Length of mandibular toothrow	7.47	7.35 (0.22; 6.97–8.08)

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Appendix 1. Material examined. Collection acronyms: ALP – Coleção Adriano Lúcio Peracchi, Universidade Federal Rural do Rio de Janeiro; IEPA – Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá; MN – Museu Nacional, Universidade Federal do Rio de Janeiro; NPM – Instituto de Biodiversidade e Sustentabilidade, Universidade Federal do Rio de Janeiro – NUPEM/UFRJ; UENFMZ – Coleção Mastozoológica da Universidade Estadual do Norte Fluminense Darcy Ribeiro). *specimens with repeated collection number in the collection records.

Sturnira lilium

Brazil: **BAHIA**: Ilhéus, Arboreto do CEPLAC (-14.757778; -39.230417, ALP 1488). **CEARÁ**: Caldas, Barbalha (-7.379167; -39.343889, MN 79939). **ESPÍRITO SANTO**: Linhares, Reserva Natural Vale (-19.115000; -39.938889, ALP 3234, 3273, 3275, 3276, 3277, 3285, 3309, 3310, 3409, 3733, 3745, 3746, 3747, 3770, 3771, 3772, 3773, 3774, 3776, 3780, 3781, 3782, 3783, 3784, 3786, 3789, 3795, 3810, 3817, 3831, 3832, 3833, 3918, 3919, 3922, 3944, 3947, 3956); Santa Tereza (-19.935833; -40.600000, ALP 65, 66, 70, 71, 109). **PARANÁ**: Foz do Iguaçú (-25.540000; -54.587500, ALP 1814). **RIO DE JANEIRO**: Barra do Piraí, Sítio da cachoeirinha Ipiabas (-22.366667; -43.866667 , ALP 5397); Itaocara, margem direita do rio Paraíba do Sul (-21.635194; -42.036000, UENFMZ 072, 073, 074); Macaé, Parque Natural Municipal Fazenda Atalaia (-22.308417; -41.999778, NPM 474, 660, 711, 713, 719, 865, 870, 871), Virgem Santa (-22.370833; -41.786944 , NPM 1257, 1250, 1249); Maricá, Parque Estadual da Serra da Tiririca (-22.973333; -43.028056, ALP 4523); Mangaratiba, Ilha de Itacuruçá (-22.944806; -43.893111, ALP 3397*, 5360); Paraty, Parque Nacional da Serra da Bocaina (-22.963056; -44.670000, MN 78135, 78134); Piraí, Estação Ecológica de Piraí (-22.628889; -43.897778, ALP 1358, 4157, 4470, 4490, 4491, 4492, 4494, 4495, 4504, 4505, 4512, 4524, 4525, 4570, 4571, 4572, 4578, 4590, 4593, 4594, 4595, 4596, 4607, 4611, 4615, 4651, 4654, 4655, 4664, 4671, 4682, 4685, 4688, 4706, 4779, 4794, 4836, 4837, 5022, 5025, 5115, 5116, 5120, 5122, 5123, 5126, 5127, 5128, 5138, 5140, 5141, 5158, 5160, 5161, 5162, 5163, 5233, 5234, 5270, 5281, 5283, 5284, 5286, 5362, 5423); Rio das Flores, Fazenda Santa Luzia (-22.094000; -43.512000, ALP 1403, 1404, 1406, 1407); Rio das Ostras, Reserva Biológica União (-22.428259; -42.035651, UENFMZ 89, 197); Teresópolis, Fazenda Santo Afonso (-22.334167; -43.015000, ALP 2329, 2330, 2331, 2332); Rio de Janeiro, Parque Nacional da Tijuca (-22.963056; -43.244444, ALP 3352), Jardim Botânico do Rio de Janeiro (-22.967367; -43.225037, ALP 7150, 7741, 7749, 7751, 7753, 7761, 7762, 7763, 7764, 7765, 7767, 7768, 7772, 7774,, 7775, 7777, 7779, 7784, 7785); Seropédica, Campus da UFRRJ (-22.763539; -43.688614, ALP 128, 129, 651, 562, 825, 1257, 1258, 1454, 3722, 5591), Flona Mario Xavier (-22.733506; -43.709236, ALP 853, 901, 903, 1012, 1015, 1441, 1442, 1443, 1445, 2289, 2490, 2492, 4275, 5871, 5872, 5875); Piraí (-22.628889; -43.897778, ALP 4664, 5163, 5140); Nova Iguaçú, Tinguá (-22.556221; -43.425954, ALP 1271, 1272, 1273, 1274, 5581, 6671, 6672, 6673, 9481, 9482), Fazenda Sacra família do Tinguá (-22.502222; -43.586944, ALP

1348, 1349, 1350, 1358, 3221). **SÃO PAULO**: Araçatuba (-21.208889; -50.432778, ALP 3397*); Botucatu (-22.885833; -48.445000, ALP 2516, 2865, 2866); Registro (-24.487500, -47.843611, ALP 1571, 1572).

Sturnira magna
Brazil: ACRE: Cruzeiro do Sul, Parque Nacional da Serra do Divisor (-8.373700; -73.180781, ALP 7096, 7122, 7176).

Sturnira tildae
Bolivia: BENI: Vaca Diez, Guayaramerin (-10.800000; -65.383333, AMNH 209408, 209409, 209419). **PANDO:** Nicolas Nuarez, Nareuda River (-11.333333; -68.500000, AMHN 248836, 248837, 248838, 248839, 248841, 248842, 248843, 248844, 248846, 248847, 248848, 248849, 248853, 248854, 248855, 248863); Manuripi, Santa Rosa (-14.077778; -66.793611, AMNH 262643).
Brazil: ACRE: Cruzeiro do Sul, Parque Nacional da Serra do Divisor (8.373700; -73.180781, ALP 7198). **AMAPÁ:** Clevelândia (4.2875272; -52.041243, ALP 4424); Ferreira Gomes, igarapé Santo Antônio (0.857778; -51.180000, IEPA 254); Pedra Branca/Serra do Navio, rio Cupuxi (1.601389; -52.490278 , IEPA 116, 387, 433); Macapá, Apa do rio Curiaú (0.000000, -51.066389, IEPA 1239, ALP 2590, 2593); Laranjal do Jari, rio Jari/rio Anacuí/Itapeuara (-0.855556; -52.539167, IEPA 291, 775, 790, 1889, 2932); Calçoene, Garimpo do São Lourenço (2.497778; -50.948889 , IEPA 3588); Amapá (2.052778; -50.792778 , IEPA 122, 138). **AMAZONAS:** Manaus (-3.100000, -60.016667, ALP 8764). **ESPÍRITO SANTO:** Linhares, Reserva Natural Vale (-19.115000; -39.938889, ALP 2143, 2434, 3156, 3158, 3239, 3300, 3806, 3812, 5643); Sooretama, Floresta Nacional dos Goytacazes (-19.196944; -40.097778, ALP 2107, 2108, 2135, 2143, 2423, 2434, 2465, 2811, 2812, 3006, 3007, 3008, 3152, 3154, 3157. **PARÁ:** Belém (-1.455833; -48.503889, ALP 2550). **RIO DE JANEIRO:** Macaé, Parque Natural Municipal Fazenda Atalaia (-22.308333; -41.999722, NPM 690, 704, 705, 709, 712, 715, 734, 857, 873, 876, 877, 915, 1007, 1008, 1018, 1019, 1020, 1021, 1022, 1033, 1040, 1045, 1168); Paraty, Parque Nacional da Serra da Bocaina (-23.041667; -44.661667, MN 77798); Rio das Ostras, Reserva Biológica União (-22.425000; -42.037000, UENFMZ 006, 010, 088, 115, 267, 295, ALP 10205, ALP p1). **TOCANTINS** (-10.183333; -48.333333, MN 73523, 73525).
Guiana Francesa: CAYENNE: Sinnamary, Paracou (5.374832, -52.954803, AMNH 266240, 266241,266253, 267460, 267461, 268554).
Perú: LORETO: Alto Amazonas, Coronel Portillo, Shahuaya (-9.055607, -73.829618, AMNH 230627). **PASCO** (-10.333266, -75.352982, AMNH 213365, 213369, 213370, 213271, 213373, 213374, 213377).
Trinidad and Tobago: TRINIDAD: Saint George, Arima Valley (10.630369, -61.280470, AMHN 149625); Saint Andrew, Sangre Grande, Rio Grande Forest (10.418641, -61.466596, AMNH 204719, 204728, 204731, 204732, 204734, 204737, 204738, 204739); Nariva County, Rio Claro (10.299471, -61.175258,

AMNH 180265); Saint George County, Maracas, Waterfalls Road (10.728917, -61.4044, AMNH 178651).

Sturnira giannae

Brazil: ACRE: Cruzeiro do Sul, Parque Nacional da Serra do Divisor (-8.379387, -73.182163, ALP 7005, 7006, 7007, 7044, 7196, 7204, 7238, 7313, 7325, 7328, 7331, 7333, 7334, 7335, 7337, 7341, 7344, 7347, 7356, 7358, 7359, 7363, 7365, 7372, 7376, 7380). AMAPÁ: Oiapoque (3.843067, -51.831998, ALP 4415); Macapá, APA do Rio Curiaú (0.123675, -51.0614025, IEPA 599, 860, 885), Plantação do IPEAN (-0.038871, -51.095188, ALP 2591); Tartarugalzinho, Lago comprido e Botos (1.349997, -50.533334, IEPA 3331, 3359); **Amapá**, Sururijú/lagos/Macarry 1.508763, -50.180558, IEPA 971, 999); Laranjal do Jari, rio Jari (0.493991, -53.166937, IEPA 1979).

Peru: PASCO (-10.333266, -75.352982, AMNH 213362).