A case of beak deformity in the Shiny Cowbird
*Molothrus bonariensis* and a review on beak deformities in wild birds in Brazil

Keila Nunes Purificação1,2

1 Programa de Pós-graduação em Ecologia e Conservação, Universidade do Estado de Mato Grosso, Nova Xavantina, MT, Brazil.
2 Corresponding author: keilanunesbio@gmail.com

Received on 02 September 2018. Accepted on 18 July 2019.

**ABSTRACT:** Beak deformities in wild birds are rarely reported. Here, I described a case of beak deformity in Shiny Cowbird, *Molothrus bonariensis*, and also provide a review on beak deformities recorded in wild birds in Brazil. In October 2016, I observed a *M. bonariensis* with a grossly elongated maxilla in the east region of the Mato Grosso state, Brazil. The literature review revealed 60 records of beak deformities in the Brazilian avifauna. The most common types of deformity were crossed maxillae or mandibles (38%), probable accidental injuries (27%), and elongations (15%). Deformities were reported in 35 bird species of 22 families. The most affected species was *Ramphastos toco* with 21 records. The number of published reports from Brazil was low overall, and are not related as an epizootic episode recorded in some bird communities.

**KEY-WORDS:** avian keratin disorder, beak abnormality, bill deformity, crossed beak, elongated beak.

Beak deformities are rarely reported in wild birds, which may be due to the fact that they are infrequent (Pomeroy 1962, Craves 1994). Beak deformities may be either permanent or temporary, and are caused by a range of factors (Pomeroy 1962). The main causes are genetic mutations, injuries (e.g., collisions with windows), diseases, nutritional deficiencies, contact with chemical pollutants (e.g., agricultural pesticides), problems during incubation, and the inadequate wear of the rhinotheca (Pomeroy 1962, Craves 1994).

Most cases of beak deformity are records of isolated cases (Pomeroy 1962, Craves 1994). One notable exception is the case of the wild birds in Alaska, USA, in particular since the 1990s. In this region, beak deformities have been recorded in more than 2500 birds of 30 species (Handel et al. 2010, Van Hemert & Handel 2010). Recurrent sightings of birds with deformed beaks were also reported in the United Kingdom in subsequent years (Harrison 2011) and in the Patagonia, Argentina (Gorosito et al. 2016). Following these epizootic episodes, considerable research efforts have been invested in an attempt to identify the possible causes of these deformities, known as avian keratin disorder (Handel et al. 2010, Van Hemert & Handel 2010, Handel & Van Hemert 2015). The most recent evidence indicates that the deformities observed in Alaska are associated with a viral infection (Zylberberg et al. 2018). However, it is still unclear whether this virus is involved in the epizootic episodes recorded in other regions of the world.

In Brazil, despite its extensive geographical area, there has been little research on the occurrence of beak deformities in wild birds, and few cases have been reported (Sazima et al. 2016, Souza et al. 2016). In the present study, I described, most probably, the first report of a case of a beak deformity in a Shiny Cowbird *Molothrus bonariensis* for Brazil. I also present a review on the published records of beak deformities in Brazil, based on a comprehensive literature search.

I used the bibliography identified in Google Scholar (https://scholar.google.com) to make a compilation on beak deformities cases in wild birds in Brazil, and other specific bibliographic sources not indexed as scientific journals of restricted circulation to Brazil and technical books. The literature search was performed using multiple combinations of the words in English and Portuguese: avian keratin disorder, beak abnormality, beak deformity, beak deformities, bill deformity, crossed beak, elongated beak, bird, wild bird and Brazil.

On the afternoon of 11 October 2016, I briefly sighted a female *M. bonariensis* with a heavily deformed beak on the campus of Mato Grosso State University (14°41’25’’S; 52°20’55’’W), located within the Bacaba Municipal Park in Nova Xavantina, Mato Grosso state, Brazil. I sighted the female again at the same site on
the following day, at around 15:00 h, local time. This individual was part of a flock of five *M. bonariensis*. On this occasion, I could confirm that the bird had a grossly elongated maxilla (Fig. 1). In addition to being elongated (approximately three times longer than the normal length of the beak), the maxilla was quite curved downward, and had some wear at the extremity. I also observed a contrast in the coloration of the beak, which was greyish black (the standard color) at the base and brown in the elongated portion of the rhinotheca. Despite this deformity, the bird appeared to be healthy, with well-groomed plumage, and similar in size to other adult females. During the short period that I was able to monitor the bird (~4 min), it captured food in a distinct manner in comparison with the other members of the flock. I observed the bird tilting its head to one right side and using the base of its beak to catch insects (apparently ants) in the grass, while the other members foraged normally. Individual adaptations in feeding behavior have been observed in birds of other species with deformed beaks (Pomeroy 1962, Van Hemert et al. 2012).

I found 60 recorded cases of beak deformities in wild birds for Brazil from 11 publications (Table 1). Deformities were recorded in 35 bird species, belonging to 22 families, of which 11 families were Passeriformes. Ramphastidae and Thraupidae had the highest number of species with deformities, with 4 each, followed by Thamnophilidae, with 3. The species with the most records were the Toco Toucan *Ramphastos toco* (*n* = 21) and the Picazuro Pigeon *Patagioenas picazuro* (*n* = 3). With the

| Taxon                  | Type of deformity                                      | Municipality-state | Date             | Source                  |
|------------------------|--------------------------------------------------------|--------------------|------------------|-------------------------|
| *Sula dactylatra*      | Curved beak                                            | Mostardas-RS       | 28 February 2006 | Franz et al. 2008       |
| *Sula leucogaster*     | Unspecified                                            | Paraná state       | 1995             | Straube 1996            |
| *Ardea alba*           | Shortening of beak - accidental                        | Araxá-MG           | 16 March 2013    | Souza et al. 2016       |
| *Cathartidae*          | Short and deformed upper mandible; lower mandible with fractured extremity - accidental | Colinas do Tocantins-TO | 27 December 2010 | Souza et al. 2016       |
| *Coragyps atratus*     |                                                        |                    |                  |                         |
| *Rallidae*             |                                                        |                    |                  |                         |
| *Aramides saracura*    | Crossed upper mandible                                 | Palmeira das Missões-RS | 13 May 2016    | Santos et al. 2018      |
| *Columbidae*           |                                                        |                    |                  |                         |
| *Patagioenas picazuro* | Upper mandible crossed                                 | Luz-MG             | May–June 2012    | Vitorino & Souza 2013   |
|                        | Upper mandible strongly twisted to the left            | Campinas-SP        | 09 August 2011   | Sazima et al. 2016      |
|                        | Upper mandible strongly twisted to the left            | Campinas-SP        | 28 April/03 May 2015 | Sazima et al. 2016   |
| *Trochilidae*          |                                                        |                    |                  |                         |
| *Clytolaema rubricauda*| Atrophy of upper mandible                             | Quatro Barras-PR   | 28 May 1987      | Straube 1996            |
|                        | Lower mandible distinctly curved to the left           | Rio de Janeiro-RJ  | 23–24 April 2015 | Sazima et al. 2016      |
| *Amazilia versicolor*  | Atrophy of lower mandible                             | Morretes-PR        | 16 November 1986 | Straube 1996            |
| *Galbulidae*           |                                                        |                    |                  |                         |
| *Galbula ruficauda*    | Crossed upper and lower mandible                       | Itiquira-MT        | 13 February 2013 | Souza et al. 2016       |
|                        | Crossed upper and lower mandible                       | Goiânia-GO         | 03 October 2015  | Souza et al. 2016       |
| *Ramphastidae*         |                                                        |                    |                  |                         |
| *Ramphastos toco*      | Malformation at the extremity of the upper mandible    | Brasília-DF        | 08 September 2007 | Souza et al. 2016       |
| Taxon          | Type of deformity                                           | Municipality-state | Date             | Source                |
|---------------|------------------------------------------------------------|--------------------|------------------|-----------------------|
| Crossed upper and lower mandible | Batayporã-MS                                                | 26 July 2009       | Souza et al. 2016 |
| Absence of the upper mandible tip - accidental | Corumbá-MS                                                  | 05 September 2009  | Souza et al. 2016    |
| Upper mandible crossed | Poços de Caldas-MG                                          | 06 November 2009   | Souza et al. 2016  |
| Fissure at the tip of the upper mandible - accidental | Caetanópolis-MG                                             | 07 January 2010    | Souza et al. 2016    |
| Absence of the lower mandible tip - accidental | Goiânia-GO                                                  | 01 April 2010      | Souza et al. 2016    |
| Upper mandible crossed | Uberaba-MG                                                  | 04 June 2010       | Souza et al. 2016   |
| Absence of the upper mandible tip - accidental | Peruíbe-SP                                                  | 30 April 2011      | Souza et al. 2016    |
| Absence of the lower mandible tip - accidental | São Roque de Minas-MG                                       | 10 June 2011       | Souza et al. 2016    |
| Lower mandible elongated; absence of the upper mandible tip | Araxá-MG                                                    | 06 April 2012      | Souza et al. 2016    |
| Upper mandible crossed | Joanópolis-SP                                              | 30 April 2013      | Souza et al. 2016   |
| Absence of approximately half of the upper mandible - accidental | Bonito-MS                                                  | 12 December 2013   | Souza et al. 2016    |
| Part of deformed upper mandible - accidental | Mundo Novo-MS                                               | 24 March 2014      | Souza et al. (2016)  |
| Part of deformed upper mandible - seems to burnt | Três Corações-MG                                            | 28 June 2014       | Souza et al. 2016    |
| Absence of the upper mandible tip - accidental | Mineiros-GO                                                 | 30 December 2014   | Souza et al. 2016    |
| Absence of approximately half of the lower mandible - accidental | Araçatuba-SP                                               | 17 February 2015   | Souza et al. 2016    |
| Absence of the upper mandible tip - accidental | Campo Grande-MS                                             | 02 May 2015        | Souza et al. 2016    |
| Absence of the upper mandible tip - accidental | Niquelândia-GO                                              | 04 July 2015       | Souza et al. 2016    |
| Perforation of the upper mandible - accidental | Natalândia-MG                                               | 30 December 2015   | Souza et al. 2016    |
| Malformation at the extremity of the upper mandible | Araçoiaba da Serra-SP                                       | 08 February 2016   | Souza et al. 2016    |
| Malformation at the extremity of the upper mandible | Campo Belo-MG                                               | 13 March 2013      | Rezende 2013         |
| Ramphastos tucanus | Absence of the upper mandible tip - accidental | Comodoro-MT        | 06 November 2011   | Souza et al. (2016)   |
| Ramphastos dicolorus | Absence of the lower mandible tip - accidental | Mairinque-SP       | 25 May 2016        | Souza et al. 2016    |
| Pteroglossus aracari | Upper mandible crossed                                      | Porciúncula-RJ     | 21 June 2013       | Souza et al. 2016    |
| Picidae          | Upper mandible elongated; absence of the upper mandible tip | Sacramento-MG      | 31 May 2014        | Souza et al. 2016     |
| Taxon               | Type of deformity                        | Municipality-state | Date            | Source                  |
|--------------------|-----------------------------------------|--------------------|-----------------|-------------------------|
| Falconidae         |                                        |                    |                 |                         |
| *Falco femoralis*  | Upper mandible elongated; crossed lower mandible | Goiânia-GO         | 25 August 2013  | Souza et al. 2016       |
| Pittacidae         |                                        |                    |                 |                         |
| *Thectocercus acuticaudatus* | Mandible vestigial | Canudos-BA         | 06 April 2016   | Souza et al. 2016       |
| *Myiopitsa monachus* | Upper mandible elongated | São Roque-SP       | 23 May 2011     | Souza et al. 2016       |
|                    | Upper mandible elongated                | Poconé-MT          | 07 June 2011    | Souza et al. 2016       |
| Thamnophilidae     |                                        |                    |                 |                         |
| *Thamnophilus torquatus* | Upper mandible crossed | Santo Antônio do Monte-MG | 26 May 2012     | Souza et al. 2016       |
| *Pyriglena leucoptera* | Upper mandible crossed | São Miguel Arcanjo-SP | 18 March 2011   | Gallo-Ortiz 2011       |
| *Percnostola rufifrons* | Lower mandible elongated | Caruá-PA           | 22 February 2012| Souza et al. 2016       |
| Furnariidae         |                                        |                    |                 |                         |
| *Furnarius rufus*   | Upper mandible strongly twisted to the right | Campinas-SP        | 08 July 2010    | Sazima et al. 2016      |
| Pipridae            |                                        |                    |                 |                         |
| *Ilicura militaris* | Upper mandible crossed                  | Nova Lima-MG       | 15 October 2015 | Souza et al. 2016       |
| Tityridae           |                                        |                    |                 |                         |
| *Pachyramphus polychopterus* | Beak more short and curved to the side | Bocaíva-MG         | 24 November 1998| Vasconcelos & Rodrigues 2006 |
| Corvida             |                                        |                    |                 |                         |
| *Gyanoconus cristatellus* | Upper mandible crossed | Alto Paraíso de Goiás-GO | 24 November 2012| Darosci 2017          |
| Troglodytidae       |                                        |                    |                 |                         |
| *Cyphorhinus arada* | Extremity of beak side-facing           | Unspecified        | Unspecified     | Sick 1997               |
| Turdidae            |                                        |                    |                 |                         |
| *Turdus leucomelas* | Unspecified                            | Bocaíva-MG         | Unspecified     | Vasconcelos & Rodrigues 2006 |
| *Turdus rufiventris* | Upper mandible elongated                | São Paulo-SP       | 14 September 2013| Souza et al. 2016       |
| Mimidae             |                                        |                    |                 |                         |
| *Mimus saturninus*  | Lower mandible deflected to left side   | Engenheiro Coelho-SP| 15 June 2011   | Souza et al. 2016       |
| Icteridae           |                                        |                    |                 |                         |
| *Cacicus haemorrhous* | Crossed upper and lower mandible       | Aracruz-ES         | 31 August 2013  | Souza et al. 2016       |
| *Chrysomus ruficapillus* | Upper mandible crossed                  | Santo Antônio do Monte-MG | 23 February 2014| Souza et al. 2016       |
| Thraupidae          |                                        |                    |                 |                         |
| *Tangara sayaca*    | Upper mandible elongated                | Piraju-SP          | 17 July 2010    | Souza et al. 2016       |
| *Tangara palmarum*  | Fissure of the lower mandible           | Porto Velho-RO     | 03 October 2012 | Souza et al. 2016       |
| *Tangara ornata*    | Upper mandible crossed                  | Ubatuba-SP         | 16 December 2010| Souza et al. 2016       |
| *Sporophila nigricollis* | Fissure in rhinotheca                | Conceição do Mato Dentro-MG | 24 November 2013| Souza et al. 2016       |
| Fringillidae        |                                        |                    |                 |                         |
| *Euphonia violacea* | Upper mandible elongated                | Ubatuba-SP         | 02 May 2016     | Souza et al. 2016       |
exception of a chick Brown Booby *Sula leucogaster* and a juvenile Masked Booby *Sula dactylatra*, all birds affected by deformities were adults.

Based on the published photographs and the case descriptions, I was able to determine that 38% of the cases of beak deformity involved crossed beaks, due to some type of deviation of the maxilla or mandible. A further 27% of the cases appeared to be the result of accidental injuries. This type of deformity was found primarily in three species of toucans, which can be explained by the large size of the beak of these species. First, in theory, the large beak of toucans probably becomes more vulnerable to accidental fractures. Second, a large, colorful beak provides more visual conspicuity, which facilitates field registration in relation to the other bird species. Birds with elongated beaks corresponded to 15% of the records. Altogether, other types of deformity contributed with 17% of the records, while the deformity was not described specifically in the cases of Brown Booby *S. leucogaster* and Pale-breasted Thrush *Turdus leucomelas* (Table 1).

Despite the large number of icterid species found in Brazil, beak deformities have been recorded in only three taxa, including the present case. Recently, a case of crossed beak was recorded for *M. bonariensis* in Argentina (Bianchini & Arenas 2018). I evaluated the photographic record of this case and observed that, in addition to the crossed beak, at least the upper mandible was also elongated. Apparently, this record and that of the present study are the only two records of beak deformity in *M. bonariensis*. In both cases, the elongation of the upper mandible and the difference in color of the elongated part of the beak is notable. Considering only the two isolated cases, the similarities found do not reveal much at the moment, but can serve as a basis for possible future observations.

As in most of cases recorded in Brazil, it was not possible to monitor the specimen over a long period to determine whether the deformity was permanent or temporary, nor to collect it for analysis. At first, it seems unlikely that this case of beak elongation, or any of the others recorded in Brazil, has an etiological origin similar to the alarming cases of beak deformity recorded in Alaska (Handel *et al.* 2010, Van Hemert & Handel 2010). In fact, the number of published reports from Brazil were low overall, and the events did not appear to be related to epizootic outbreaks. However, beak deformities are more common than suggested by the literature, given that not all cases are reported in scientific publications (Vasconcelos & Rodrigues 2006). Moreover, without systematized research efforts on the subject this issue cannot be elucidated. Laboratory analyses, the long-term monitoring of affected individuals, even in a small number of cases, and formal publication of records may help to better clarify the causes and consequence of beak deformities in birds. These approaches will contribute to the detection of possible threats to the wild bird fauna.

**ACKNOWLEDGEMENTS**

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brazil (CAPES) – Finance Code 001.

---

**Figure 1.** Female Shiny Cowbird *Molothrus bonariensis* with beak elongated (A) and comparison with a male with normal beak (B) in Nova Xavantina, Mato Grosso state, Brazil. Photo author: K.N. Purificação.
REFERENCES

Bianchini M. & Arenas C. 2018. Registros documentados de aves con picos deformados hallados en la Argentina. Notas Faunísticas 233: 1–11.
Craves J.A. 1994. Passerines with deformed bills. North American Bird Bander 19: 14–18.
Darosci A.A.B. 2017. Registro de deformação em bico de Gralha-do-campo, Cyanocorax cristatellus. Atualidades Ornitológicas 196: 27.
Franz I., Ott P.H., Machado R. & Fausto I.V. 2008. Primeiros registros de Sula dactylatra Lesson, 1831 (Pelecaniformes: Sulidae) no estado do Rio Grande do Sul, Brasil. Revista Brasileira de Ornitolgia 16: 178–180.
Gallo-Ortiz G. 2011. Deformidade de bico em um indivíduo de Papa-taoca-do-sul, Pyrgilena leucoptera (Passeriformes: Thamnophilidae), na Mata Atlântica do estado de São Paulo, Brasil. Atualidades Ornitológicas 164: 20–21.
Gorosito C.A., Gonda H. & Cueto V.R. 2016. Beak deformities in north Patagonian birds. Ornithologia Neotropical 27: 289–295.
Handel C.M., Pajot L.M., Matsuoka S.M., Van Hemert C., Terenzi J., Talbot S.L., Muleahy D.M., Meteyer C.U. & Trust K.A. 2010. Epizootic of beak deformities among wild birds in Alaska: an emerging disease in North America? Auk 127: 882–898.
Handel C.M. & Van Hemert C. 2015. Environmental contaminants and chromosomal damage associated with beak deformities in a resident North American passerine. Environmental Toxicology and Chemistry 34: 314–327.
Harrison T. 2011. Beak deformities of garden birds. British Birds 104: 538–541.
Pomeroy D.E. 1962. Birds with abnormal bills. British Birds 55: 49–73.
Rezende M.A. 2013. Um caso de deformidade de bico em Tucanuçu Ramphastos toco em Minas Gerais, sudeste do Brasil. Atualidades Ornitológicas 174: 23.
Santos L.E.S., Wägener T.L.S. & Almeida R.S. 2018. Registro de deformação no bico de Saracura-do-mato, Aramides saracura (Gruiformes: Rallidae). Atualidades Ornitológicas 201: 26.
Sazima I., Hipolito J.V. & D’Angelo G.B. 2016. Mouth troubles: possible outcomes for three bird species with deformed bills. Revista Brasileira de Ornitolgia 24: 354–357.
Sick H. 1997. Ornitolgia brasileira. Rio de Janeiro: Editora Nova Fronteira.
Souza T.O., Silva L.F. & Silva C.R. 2016. Novos registros sobre deformidades de bicos em aves brasileiras. Atualidades Ornitológicas 192: 50–56.
Straube F.C. 1996. Dois casos de anormalidade em bicos de beija-flores (Trochilidae; Aves). Acta Biologica Leopoldensia 18: 167–169.
Van Hemert C. & Handel C.M. 2010. Beak deformities in Northwestern Crows: evidence of a multispecies epizootic. Auk 127: 746–751.
Van Hemert C., Handel C.M. & O’Brien D.M. 2012. Stable isotopes identify dietary changes associated with beak deformities in Black-Capped Chickadees (Poecile atricapillus). Auk 129: 460–466.
Vasconcelos M.F & Rodrigues M. 2006. Bill deformity in a White-winged Becard, Pachyramphus polychroerus, (Aves: Suboscines: Tityridae) from Minas Gerais, Brazil. Revista Brasileira de Ornitolgia 14: 165–166.
Vitorino B.D. & Souza T.O. 2013. Comportamento reprodutivo de um indivíduo de Patagioenas picazuro (Columbidae) com deformidade no bico. Atualidades Ornitológicas 175: 22.
Zylberberg M., Van Hemert C., Handel C.M. & DeRisi J.L. 2018. Avian keratin disorder of Alaska black-capped chickadees is associated with Poecivirus infection. Virology Journal 15: 100.

Associate Editor: Luis F. Silveira.