

Mouth troubles: possible outcomes for three bird species with deformed bills

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Received on 28 March 2016. Accepted on 06 December 2016.

ABSTRACT: Bill deformities occur with low frequency among birds (0.5–2%). The deformity degree may influence several phases of the birds' life, from feeding to feather maintenance, the latter affecting thermoregulation, parasite proliferation, courtship and mating. We recorded three bird species, a pigeon, a hummingbird and an ovenbird, with similar bill deformity (crossed bill). This deformity affected a female Brazilian Ruby (*Clytolaema rubricauda*) with lower mandible skewed to the left, an unsexed individual and a probable female of the Picazuro Pigeon (*Patagioenas picazuro*) with similar deformity, and an unsexed individual of the Rufous Hornero (*Furnarius rufus*) with upper mandible strongly twisted to the left. We hypothesise that possible outcomes due to crossed bill vary with the deformity degree, and the species, sex, and general habits of the affected birds.

KEY-WORDS: crossed bill, detrimental effects, non-Passeriformes, Passeriformes.

Bill deformities seem rare among birds, with recorded occurrence of about 0.5–2% (Craves 1994, Vereá & Vereá 2010). These deformities may be due to injuries and diseases, malformations, malnutrition and possibly genetic factors and pollutants (Craves 1994), although evidences for any of these causes are inconclusive (Fox 1952, Pomeroy 1962, Sharp & Neill 1979). The deformity degree may influence several phases of the birds' life, from feeding to feather maintenance, the latter affecting thermoregulation, parasite proliferation, courtship and mating (Pomeroy 1962, Sharp & Neill 1979, Thompson & Terkianian 1991, Zampiga *et al.* 2004). We describe and illustrate herein three bird species, a hummingbird, a pigeon, and an ovenbird, from southeastern Brazil, which share a similar deformity (crossed bill) but have different habits. Additionally, we comment on the possible consequences of this deformity, as the outcomes probably vary according to the deformity degree, species, sex, and general habits of the affected birds. We are unaware of such comparative reports, less so about the possible outcomes depending on the birds' habits.

The hummingbird was recorded in the Parque Nacional do Itatiaia (22°26'20"S; 44°36'28"W), Rio de Janeiro, 23–24 April 2015. There are hummingbird feeders at this site, as well as introduced and native flower species. The pigeons were recorded in Campinas (22°48'42"S; 47°04'21"W), São Paulo, 09 August 2011 and 28 April and 03 May 2015. There is food provisioning (corn kernels,

poultry feed, and bran) for the domestic waterfowl raised at the study site (Corbo *et al.* 2013). The ovenbird was also recorded in Campinas (22°49'59"S; 47°04'41"W), 08 July 2010. We observed the birds with bare eye and through a 70–300 mm telephoto lens mounted on a camera at a distance of 1–5 m. Throughout the observational sessions, we used the “*ad libitum*”, “sequence”, and “focal animal” samplings (Altmann 1974), which are adequate to record fortuitous or rare events. Voucher digital photographs of the birds with bill deformities are on file at the Museu de Zoologia da Universidade Estadual de Campinas (ZUEC).

We recorded a Brazilian Ruby (*Clytolaema rubricauda*) female with the lower mandible distinctly skewed to the left (Figure 1A). The bird regularly visited hummingbird feeders, perching on a nearby twig afterwards (Figures 1A, B). Besides taking the sweetened water from the feeders, the bird sought nectar from flowers in the vicinity. The visited flowers had short corollas (10–15 mm) and the bird was able to extend her tongue into the corolla to take nectar. The distinctly crossed bill (Figure 1A) did not impair the intake of liquids, as the tongue could be drawn out entirely (Figure 1B). However, we recorded no hawking for insects by this individual, a common foraging mode in this species (I.S., pers. obs.).

Two Picazuro Pigeon (*Patagioenas picazuro*) individuals were recorded with bill deformities. An unsexed bird had its lower mandible strongly skewed to the left (Figure 1C). Another individual had a similar bill

deformity (Figure 1D). The first individual was recorded picking corn kernels and poultry food pellets (Figure 1C), which it handled with more effort than individuals with normal bill. The pigeon with deformed bill pecked at each kernel or pellet up to five times before it was able to secure and ingest it, whereas pigeons with normal bill habitually pecked at the food once to ingest this food type. Despite its preening, this pigeon displayed a somewhat untidy plumage (Figure 1C). The second individual

was recorded brooding (Figure 1D) and, occasionally, rearranging sticks in the nest.

We recorded an unsexed Rufous Hornero (*Furnarius rufus*) with its upper mandible strongly twisted to the right (Figures 1E, F). The bird perched on a dead branch sunning itself, resting, and stretching. Additionally, the bird preened the plumage repeatedly, but its deformed bill made it incapable to arrange the feathers adequately, as these were clearly unkempt (Figures 1E, F).



FIGURE 1. Three instances of birds with distinct habits and similar deformities (crossed bill). The lower mandible of the Brazilian Ruby (*Clytolaema rubricauda*) female is skewed to the left (a); the unkempt plumage on her chest indicates an inability to rearrange the feathers properly, and the drawn out tongue makes possible the intake of sweetened water from feeders and nectar from flowers (b); provisioning of corn kernels and poultry feed pellets are awkwardly picked by this Picazuro Pigeon (*Patagioenas picazuro*) with its lower mandible strongly skewed to the left – notice untidy back plumage and wing feathers (c); a similar bill deformity did not prevent the reproduction of another individual, probably a female due to her behavior – brooding and rearranging sticks on the nest (d); the untidy feathers on the chest of the Rufous Hornero (*Furnarius rufus*), with the upper mandible strongly twisted to the right, indicates the importance of the bill to feather maintenance (e); the misaligned wing feathers show the troubles the bird had with plumage maintenance (f). Photos: I. Sazima (a, b, e, f), J. V. Hipolito (c), G. B. D'Angelo (d).

The three deformity instances recorded herein are similar (crossed bill) but occur in species with distinct habits. The deformity degree varies from moderate in one non-passerine (hummingbird) to great in a non-passerine (pigeon) and a passerine (oven-bird).

The crossed bill did not impair taking flower nectar by the Brazilian Ruby female, but apparently restricted her to flowers with shorter corollas than those visited by individuals with normal bill (corollas up to 80 mm, see Sazima *et al.* 1996). In addition, the crossed bill likely hampered hawking for insects, which is an important component in the diet of hummingbirds (Schuchmann 1999). This protein source would be missing by the recorded female. Additionally, the plumage of this female was unkempt, a probable consequence of the crossed bill (Sharp & Neill 1979, Vereá & Vereá 2010). Untidy plumage has the potential to negatively affect thermoregulation (Burton 1985, Gill 2007) and may contribute to parasite proliferation (Pomeroy 1962, Arendt & Arendt 1986, Thompson & Terkianian 1991). Also, the untidy plumage has the potential to negatively affect reproduction, as males could be less prone to court a female in such condition (Burton 1985, Zampiga *et al.* 2004, Amat *et al.* 2011). Moreover, the misaligned mandibles likely hamper gathering and arranging nest material, as nest in hummingbirds is made exclusively by females (Schuchmann 1999). Thus, this deformity type could negatively affect nest construction and, consequently, her reproduction. In addition, her apparent inability to catch insects by hawking and the consequent lack of protein prior to reproduction possibly affects her whole reproductive cycle.

Picking corn kernels and poultry food pellets by the Picazuro Pigeon with crossed bill went with more handling effort that would be displayed by individuals with normal bill. We suppose that without the food provisioning (Corbo *et al.* 2013), the deformed pigeons would not thrive as well as at the studied site. Both the Picazuro Pigeon we observed had untidy plumage, with the consequences cited above for the hummingbird. However, plumage condition seemed not to affect this pigeon species strongly, as one individual with crossed bill bred at least once (present paper). Gathering sticks to for the nest is a male issue in the life of the Picazuro Pigeon, whereas the female arranges the sticks in the platform she already sits (Baptista *et al.* 1997). A male with deformed bill probably would have trouble to breed, since a crossed bill probably would hamper gathering of nest material. Thus, we suppose that the brooding and nest arranging individual was a female.

The strongly twisted bill of the Rufous Hornero (*Furnarius rufus*) likely hindered its feeding, as this bird species picks with its bill tip the insects and other arthropods that are its staple food (Schubart *et al.* 1965,

Corbo *et al.* 2013). On the other hand, for birds that are used to feed in garden and backyard in bird-feeders (Stiteler 2008) feeding troubles are probably lessened. Additionally, this individual would have trouble to gather and work the mud for the construction of its characteristic nest (Sick 1997). The more unkempt plumage of the ovenbird as compared with the precedent species possibly increases the disadvantages already mentioned for the other recorded birds. Additionally, the bill deformity and the untidy plumage probably hamper the reproduction, as the Rufous Hornero calls in duets and the mated pair builds the nest together (Sick 1997, Corbo *et al.* 2013). Thus, the bill deformity degree we recorded for this ovenbird individual most likely reduces its survival altogether.

The same deformity type (crossed bill) would affect a bird in different ways and degrees, according to the general habits of the afflicted bird. For instance, the Brazilian Ruby female had the least deformity degree among the recorded birds, but would be more affected than the Picazuro Pigeon female, whose deformity was comparatively more prominent. This difference would be related to courtship and nest building (Baptista *et al.* 1997, Schuchmann 1999), as already pointed out above. The most impaired bird in several fundamental phases such as feeding, feather maintenance, and reproduction seemed to be the Rufous Hornero. However, all the three species reported herein may have their life cycle abbreviated due to their bill deformity. We hypothesise that the possible outcomes vary according to the degree of the deformity, and the species, sex, and general habits of the recorded birds (Fox 1952, Pomeroy 1962, Vasconcelos & Rodrigues 2006, Vereá & Vereá 2010).

ACKNOWLEDGEMENTS

We thank to the staff of the Parque Ecológico Prof. Hermógenes de Freitas Leitão Filho for allowing our field studies at the park; Marlies Sazima, Bruno Fernandes and Micael E. Nagai for their loving support in the field and at home; the CNPq for earlier financial support to IS; two anonymous reviewers and the editor improved the text with their critical appraisal.

REFERENCES

- Altmann, J. 1974.** Observational study of behavior: sampling methods. *Behaviour*, 49: 227–267.
- Amat, J.; Rendón, M.; Garrido-Fernández, J.; Garrido, A.; Rendón-Martos, M. & Pérez-Gálvez, A. 2011.** Greater Flamingos *Phoenicopterus roseus* use uropygial secretions as make-up. *Behavioral Ecology and Sociobiology*, 65: 1–9.
- Arendt, W. J. & Arendt, A. I. 1986.** Bill deformity in a Pearly-eyed Thrasher from Montserrat, West Indies. *North American Bird Bander*, 11: 51–52.

- Baptista, L. F.; Trail, P. W. & Horblit, H. M. 1997.** Family Columbidae (pigeons and doves), p. 60–243. In: del Hoyo, J.; Elliot, A. & Sargatal, A. (eds.). *Handbook of the birds of the world, v. 4, sandgrouse to cuckoos*. Barcelona: Lynx Edicions.
- Burton, R. 1985.** *Bird behavior*. New York: Alfred A. Knopf.
- Corbo, M.; Macarrão, A.; D'Angelo, G. B.; Almeida, C. H.; Silva, W. R. & Sazima, I. 2013.** *Aves do campus da Unicamp e arredores*. Vinhedo: Avisbrasilis Editora.
- Craves, J. A. 1994.** Passerines with deformed bills. *North American Bird Bander*, 19: 14–18.
- Fox, W. 1952.** Behavioral and evolutionary significance of the abnormal growth of beaks. *Condor*, 54: 160–162.
- Gill, F. B. 2007.** *Ornithology*, 3rd edn. New York: W. H. Freeman and Company.
- Pomeroy, D. E. 1962.** Birds with abnormal bills. *British Birds*, 55: 49–72.
- Sazima, I.; Buzato, S. & Sazima, M. 1996.** An assemblage of hummingbird-pollinated flowers in a montane forest in southeastern Brazil. *Botanica Acta*, 109: 149–160.
- Schubart, O.; Aguirre, A. C. & Sick, H. 1965.** Contribuição para o conhecimento da alimentação das aves brasileiras. *Arquivos de Zoologia*, 12: 95–249.
- Schuchmann, K. L. 1999.** Family Trochilidae (hummingbirds), p. 468–680. In: del Hoyo, J.; Elliot, A. & Sargatal, J. (eds.). *Handbook of the birds of the world, v. 5, barn-owls to hummingbirds*. Barcelona: Lynx Edicions.
- Sharp, M. S. & Neill, R. L. 1979.** Physical deformities in a population of wintering black birds. *Condor*, 81: 427–430.
- Sick, H. 1997.** *Ornitologia brasileira*. Rio de Janeiro: Nova Fronteira.
- Stiteler, S. 2008.** *City birds country birds*. Cambridge: Adventure Publications.
- Thompson, C. W. & Terkanian, B. A. 1991.** Abnormally long bill in a young Curve-billed Thrasher. *Journal of Field Ornithology*, 62: 157–161.
- Vasconcelos, M. F. & Rodrigues, M. 2006.** Bill deformity in a White-winged Becard, *Pachyramphus polychopterus*, (Aves: Suboscines: Tityridae) from Minas Gerais, Brazil. *Revista Brasileira de Ornitologia*, 14: 165–166.
- Verea, C. & Verea, J. M. 2010.** Deformidade del pico en el Azulejo de Jardín *Thraupis episcopus* (Passeriformes: Thraupidae) de Venezuela. *Revista Brasileira de Ornitologia*, 18: 64–67.
- Zampiga, E.; Hoi, H. & Pilastro, A. 2004.** Preening, plumage reflectance and female choice in Budgerigars. *Ethology, Ecology & Evolution*, 16: 339–349.

Associate Editor: Caio G. Machado.