

Malformation of the right forelimb in *Trachemys dorbigni*

Caio Henrique de Oliveira Carniatto^{1*}, Jussara Maria Leite Oliveira Leonardo², Ricardo Lourenço-de-Moraes

¹Doutorando em Anatomia dos Animais Domésticos e Silvestres, Departamento de Cirurgia, Faculdade de Medicina Veterinária e Zootecnia da Universidade de São Paulo. São Paulo-SP Brasil. E-mail: carniatto@usp.br

²Departamento de Medicina Veterinária do Centro Universitário Cesumar (UNICESUMAR). Maringá-PR Brasil. E-mail: jussaraleonardo@hotmail.com

³Departamento de Ecologia do Instituto de Ciências Biológicas da Universidade Federal de Goiás. Goiânia-GO Brasil. E-mail: ricardo_lmoraes@hotmail.com

*Autor para correspondência

ABSTRACT. Malformations in turtles, although not rare, have been poorly documented. This paper presents a case of malformation in a black-bellied slider *Trachemys dorbigni*. A free-living juvenile male specimen was evaluated. Radiographic examination showed absence of the right forelimb. Malformations may be due to chemical changes in the environment. It is possible that this species has mutated because of strong anthropic pressure, as its natural environment has been degraded.

Keywords: Agenesis, black-bellied slider, genetic abnormality, tortoise

Malformação no membro torácico direito em *Trachemys dorbigni*

RESUMO. Malformação em tartarugas, embora não raras, são pouco documentadas. No seguinte trabalho é apresentado um caso de malformação em um tigre d'água *Trachemys dorbigni*. Foi avaliado um espécime macho juvenil, de vida livre. O exame radiográfico constatou a ausência do membro torácico direito. Problemas de malformações podem ocorrer devido a alterações químicas no ambiente. É possível que a espécie esteja sofrendo mutações devido à forte pressão antrópica, o qual vem alterando o seu ambiente natural.

Palavras-chave: Agenesia, anomalia genética, tartaruga, tigre-d'água

Malformación del miembro torácico derecho en *Trachemys dorbigni*

RESUMEN. Malformación en las tortugas, aunque no raras, son poco documentadas. En el siguiente trabajo es presentado un caso de malformación en una tortuga *Trachemys dorbigni*. Se evaluó un espécimen macho juvenil, de vida libre. El examen radiográfico constató la ausencia del miembro torácico derecho. Los problemas de malformación pueden ocurrir debido a cambios químicos en el ambiente. Es posible que la especie esté sufriendo mutaciones debido a una fuerte presión antrópica, lo cual viene alterando su ambiente natural.

Palabras clave: agenesia, anomalía genética, tigre de río, tortuga

Introduction

Congenital malformations are genetic or environmental changes that occur during embryonic or fetal development, perhaps consisting of a structural, functional, or both defects ([Cabral-Oliveira et al., 2007](#), [Sant'Anna](#)

[and Paranhos da Costa, 2013](#)). Although not regarded as diseases, such defects may be caused by pathologies, accidents, and genetic or organic factors ([Santos and Dias, 2005](#)). The diagnosis of animals with congenital deformities is a challenge in veterinary medicine ([Marcolongo-Pereira et al., 2010](#)).

For the genus *Trachemys* a variation in the pattern of carapacial scutation (Bujes and Verrastro, 2007), no eyeball, and agenesis of the right upper limb are reported (Martins et al., 2003). *Trachemys dorbigni* is a species that occurs in Argentina, Uruguay, and southern Brazil (Rhodin et al., 2008). In the state of Paraná, Brazil, this species has expanded its area due to the introduction of individuals as pets (Bernarde and Machado, 2002).

Case report

In April 2011, the veterinary hospital of Centro Universitário Cesumar (UNICESUMAR), in Maringá/Paraná, Brazil, received a male young black-bellied slider *Trachemys dorbigni* (snout-vent length = 80 mm) from rural area of Maringá (S 23° 29' W 51° 59', datum: WGS84; 468 m high), which was provided by the police. During anamnesis, it was found that the animal had no clinical signs; however, there was no right forelimb (Figure 1). No external injury was observed on the seed coat, and radiographic examination confirmed absence of the right forelimb bones. The specimen was taken and released by the police in a protected area. As it was a free-living turtle in good health, an ultrasonography examination was performed to investigate malformations of internal organs.



Figure 1. Radiography of the *Trachemys dorbigni*, dorsal view. A) Notice the absence of the right forelimb. B) Scapula (sc), ribs (arrows), and the right forelimb trace (*). Maringá - 2011

Discussion

Congenital anomalies can be any change that occurs in the embryonic development, generating individuals with small asymmetries or functional pathologies (Santos and Dias, 2005). Turtles are good models in research of instability during fetal

development because malformations are easily recognized (Velo-Antón et al., 2011).

The documentation of congenital malformation in free-living animals consists of isolated case reports (Bárceñas-Ibarra et al., 2015). It can be difficult to determine patterns of morphological and pathological variations, as well as their frequencies in wild populations. In turtles are reported dicephalic animals, hepatic duplication and gastric malformation (Palmieri et al., 2013) reduced carapace, scoliosis and lordosis (Bárceñas-Ibarra et al., 2016).

Studies report that environmental contamination can cause mutations in vertebrates, resulting in fetal malformations (Sparling et al., 2006). In turtles, it was found that herbicides can affect organs and embryos, as well as mercury contamination (Hopkins et al., 2013, Zapata et al., 2014) and polychlorinated biphenyls (Matsumoto et al., 2014). Due to the strong anthropic pressure observed in the region, it is possible that *Trachemys dorbigni* has been mutating, and this can affect the permanence of this species in its natural environment.

Bibliographic references

- Bárceñas-Ibarra, A., Rojas-Lleonart, I., Lozano-Guzmán, R. I. & García-Gasca, A. 2016. Schistosomus Reflexus Syndrome in Olive Ridley Sea Turtles (*Lepidochelys olivacea*). *Veterinary Pathology*, 54, 171-177.
- Bárceñas-Ibarra, A., Cueva, H., Rojas-Lleonart, I., Abreu-Grobois, F. A., Lozano-Guzmán, R. I., Cuevas, E. & García-Gasca, A. 2015. First approximation to congenital malformation rates in embryos and hatchlings of sea turtles. *Birth Defects Research Part A: Clinical and Molecular Teratology*, 103, 203-224.
- Bernarde, P. S. & Machado, R. A. 2002. Fauna reptiliana da bacia do rio Tibagi. In: Medri, M. E., Bianchini, E., Shibatta, O. A. & A., P. J. (eds.) *A Bacia do rio Tibagi*. MC-Gráfica, Londrina, Paraná.
- Bujes, C. S. & Verrastro, L. 2007. Supernumerary epidermal shields and carapace variation in Orbigny's slider turtles, *Trachemys dorbigni* (Testudines, Emydidae). *Revista Brasileira de Zoologia*, 24, 666-672.
- Cabral-Oliveira, F. C. L., Albuquerque, L. C., São Paulo, C., Lacerda, A. M., Fortuna, F. N., Farias, S., Portela, D., Christi, A. & Acosta, A. X. 2007. Defeitos Congênitos-tópicos

- relevantes. *Gazeta Médica da Bahia*, 77, S32-S39.
- Hopkins, B. C., Willson, J. D. & Hopkins, W. A. 2013. Mercury exposure is associated with negative effects on turtle reproduction. *Environmental Science & Technology*, 47, 2416-2422.
- Marcolongo-Pereira, C., Schild, A. L., Soares, M. P., Vargas Jr, S. F. & Riet-Correa, F. 2010. Defeitos congênitos diagnosticados em ruminantes na Região Sul do Rio Grande do Sul. *Pesquisa Veterinária Brasileira*, 30, 816-826.
- Martins, R. T., Barreto, L. & Pereira-Martins, S. R. 2003. Observação de anomalias congênitas em tartarugas de água doce *Trachemys adiutrix* (Vanzolini, 1995) em ambientes naturais. *Boletim do Laboratório de Hidrobiologia*, 16, 75-77.
- Matsumoto, Y., Hannigan, B. & Crews, D. 2014. Embryonic PCB exposure alters phenotypic, genetic, and epigenetic profiles in turtle sex determination, a biomarker of environmental contamination. *Endocrinology*, 155, 4168-4177.
- Palmieri, C., Selleri, P., Di Girolamo, N., Montani, A. & Della Salda, L. 2013. Multiple congenital malformations in a dicephalic spur-thighed tortoise (*Testudo graeca iberica*). *Journal of Comparative Pathology*, 149, 368-371.
- Rhodin, A. G. J., Pritchard, P. C. H., van Dijk, P. P., Saumure, R. A., Buhlmann, K. & Iverson, J. B. 2008. *Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*. Chelonian Research Monographs.
- Sant'Anna, A. C. & Paranhos da Costa, M. J. R. 2013. Validity and feasibility of qualitative behavior assessment for the evaluation of Nellore cattle temperament. *Livestock Science*, 157, 254-262.
- Santos, R. S. & Dias, I. M. V. 2005. Refletindo sobre a malformação congênita. *Revista Brasileira de Enfermagem*, 58, 592-596.
- Sparling, D. W., Matson, C., Bickham, J. & Doelling-Brown, P. 2006. Toxicity of glyphosate as Glypro® and LI700 to red-eared slider (*Trachemys scripta elegans*) embryos and early hatchlings. *Environmental Toxicology and Chemistry*, 25, 2768-2774.
- Velo-Antón, G., Becker, C. G. & Cordero-Rivera, A. 2011. Turtle carapace anomalies: the roles of genetic diversity and environment. *PLoS One*, 6, e18714.
- Zapata, L. M., Bock, B. C. & Palacio, J. A. 2014. Mercury concentrations in tissues of Colombian Slider turtles, *Trachemys callirostris*, from northern Colombia. *Bulletin of Environmental Contamination and Toxicology*, 92, 562-566.

Article History:

Received 8 February 2017

Accepted 6 March 2017

Available on line 31 May 2017

License information: This is an open-access article distributed under the terms of the Creative Commons Attribution License 4.0, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.