

**Description of cases of axial bifurcation of the Mediterranean Spur-thighed tortoise –
Testudo graeca Linnaeus, 1758 (Testudinidae, Reptilia)
based on field research and herpetological collection of ZIN RAS**

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Article info

Short Communication

[https://doi.org/10.18500/1814-6090-2024-24-](https://doi.org/10.18500/1814-6090-2024-24-1-2-51-54)

1-2-51-54

EDN: WARHYQ

Received August 18, 2023,
revised August 28, 2023,
accepted September 3, 2023,
published June 28, 2024

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Abstract. Axial duplications are the most complex variant of anomalies characteristic of animals, including turtles. For turtles, the following variants of duplications are described: anakatamesodimus, derodimus, dicephaly, Siamese twins. We present a description of two specimens of the Mediterranean tortoise (*Testudo graeca* Linnaeus, 1758): with dicephaly and ischio-omphalopagia, a variant of Siamese twins, in which lateral fusion occurs in the region of the sacrum. Our data expand the geography of skeletal anomalies (duplications) and may be useful in studying the general spectrum of reptile pathologies.

Keywords: *Testudo graeca*, axial bifurcation, dicephaly, Siamese twins, teratology, Dagestan

For citation: Gordeev D. A., Mazanaeva L. F., Gichikhanova U. A. Description of cases of axial bifurcation of the Mediterranean Spur-thighed tortoise – *Testudo graeca* Linnaeus, 1758 (Testudinidae, Reptilia) based on field research and herpetological collection of ZIN RAS. *Current Studies in Herpetology*, 2024, vol. 24, iss. 1–2, pp. 51–54 (in Russian). <https://doi.org/10.18500/1814-6090-2024-24-1-2-51-54>, EDN: WARHYQ

REFERENCES

Ananyeva N. B., Orlov N. L., Khalikov R. G., Darevsky I. S., Ryabov S. A., Barabanov A. V. *Atlas of Reptiles of Northern Eurasia (Taxonomic Diversity, Geographical Distribution and Conservation Status)*. St Petersburg, Zoological Institute of RAS Publ., 2004. 232 p. (in Russian).

Dunaev E. A., Orlova V. F. *Amphibians and Reptiles of Russia: Key Atlas*. Moscow, Fiton XXI, 2017. 328 p. (in Russian).

Caullery M. Remarques sur des cas de bicéphalie. *Bulletin de la Société zoologique de France*, 1931, vol. 56, pp. 362–363.

Mazanaeva L. F., Gichikhanova U. A. *Testudo graeca* (Mediterranean Spur-thighed Tortoise). Embryological twinning. *Herpetological Review*, 2020, vol. 51, iss. 3, pp. 285.

Palmieri C., Selleri P., Di Girolamo N., Montani A., Della Salda L. Multiple congenital malformations in a dicephalic spur-thighed tortoise (*Testudo graeca iberica*). *Journal of Comparative Pathology*, 2013, vol. 149, iss. 2-3, pp. 368–371. <https://doi.org/10.1016/j.jcpa.2012.11.244>

Rothschild B. M., Schultze H.-P., Pellegrini R. *Herpetological Osteopathology: Annotated Bibliography of Amphibians and Reptiles*. New York, Springer, 2012a. 463 p.

Rothschild B. M., Schultze H. P., Pellegrini R. Osseous and other hard tissue pathologies in turtles and

abnormalities of mineral deposition. In: *Morphology and Evolution of Turtles. Vertebrate Paleobiology and Paleoanthropology*. Dordrecht, Springer, 2012b, pp. 501–534.

Stojanov A. New data of abnormalities on the bony and horny shell of tortoises from Bulgaria. *Acta Zoologica Bulgarica*, 2005, vol. 57, iss. 1, pp. 25–30.

Vellard J., Penteado J. Un cas de bicéphalie chez un serpent (*Liophis almadensis*). *Bulletin de la Société de Zoologie de France*, 1931, vol. 56, pp. 360–362.

Wallach V. Axial bifurcation and duplication in snakes. Part I. A synopsis of authentic and anecdotal cases. *Bulletin of Maryland Herpetological Society*, 2007, vol. 43, iss. 2, pp. 57–95.

Wallach V. Axial bifurcation and duplication in snakes. Part VI. Aten-year update on authentic cases. *Bulletin of Chicago Herpetological Society*, 2018, vol. 53, iss. 1, pp. 1–20.

Wallach V., Ineich I. Axial Bifurcation and Duplication in Snakes. Part VIII. Specimens Deposited in or Affiliated with the Natural History Museum of Paris (MNHN). *Russian Journal of Herpetology*, 2021, vol. 28, iss. 1, pp. 33–42. <https://doi.org/10.30906/1026-2296-2021-28-1-33-42>

Williston S. W., Gregory W. K. *Osteology of the Reptiles*. Cambridge, Harvard University Press, 1925. 300 p.

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