

Short note

## *A Case of Deformed Carapaces of the European Pond Turtle (*Emys orbicularis*) from Veleka River (SE Bulgaria)*

Ivelin A. Mollov<sup>1\*</sup>, Tsvetelina D. Petrova<sup>2</sup>

<sup>1</sup>University of Plovdiv "Paisii Hilendarski", Faculty of Biology, Department of Ecology and Environmental Conservation, 24 Tzar Assen Str., BG-4000 Plovdiv, BULGARIA

<sup>2</sup>Regional Natural History Museum – Plovdiv, 34 Hristo G. Danov Str., BG-4000 Plovdiv, BULGARIA

\*Corresponding author: mollov\_i@uni-plovdiv.bg

**Abstract.** Herein we report a peculiar case of deformed carapaces of 4 individuals of the European Pond Turtle (*Emys orbicularis*) from Veleka River in "Strandzha" Nature Park. A discussion of their potential causes and comparison with similar cases are also given.

**Key words:** carapaces deformities, *Emys orbicularis*, Veleka River, Strandzha, Bulgaria.

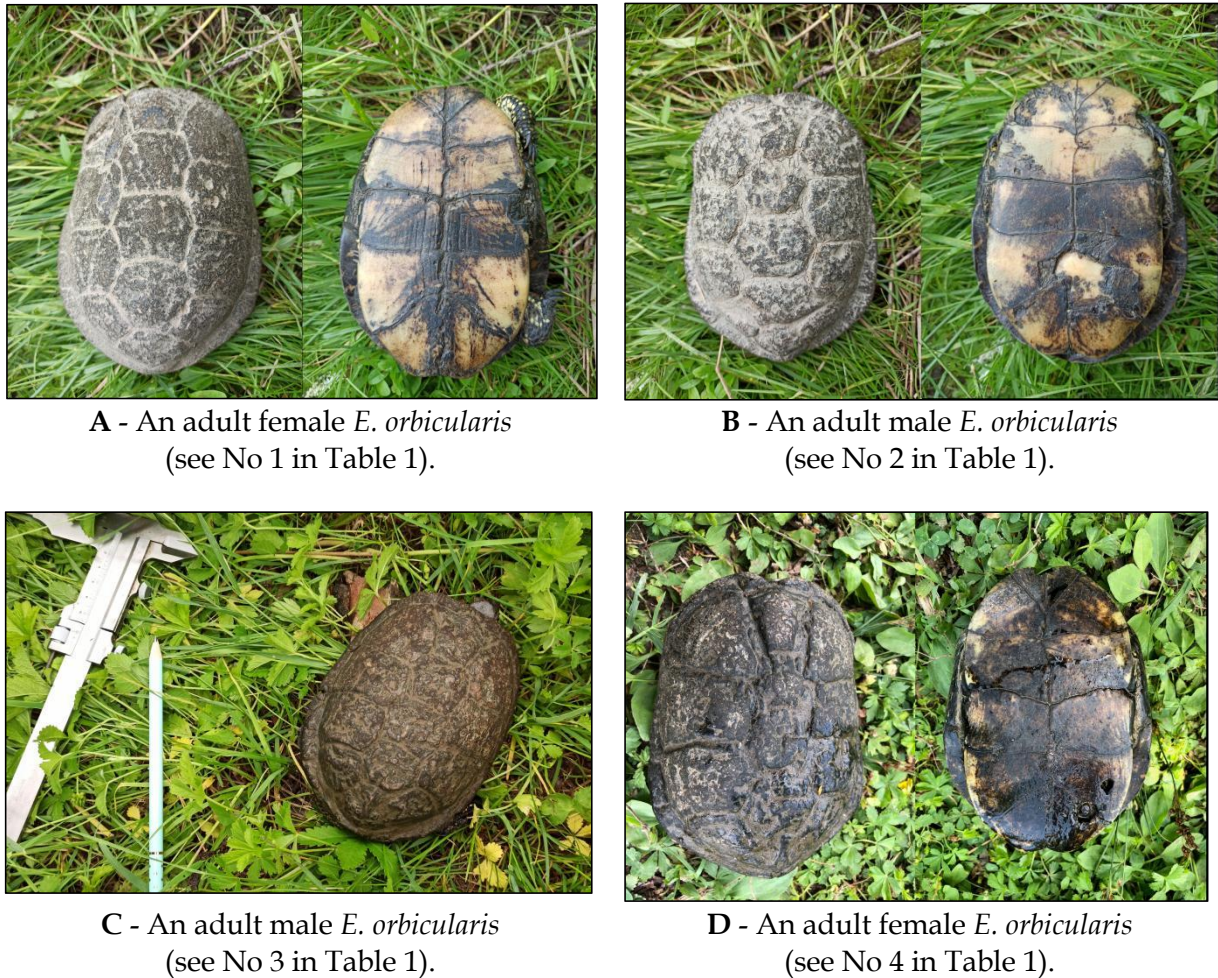
During a monitoring study on the populations of the European Pond Turtle *Emys orbicularis* (Linnaeus, 1758) and the Balkan Pond Turtle *Mauremys rivulata* (Valenciennes, 1833) in "Strandzha" Nature Park (Mollov et al., 2021) we managed to capture 4 adult individuals with strangely deformed carapaces (Fig. 1). All turtles were captured on land by hand in a spillway at the mouth of Veleka River (42°03'55.7"N, 27°58'24.2"E) and on the right riverbank, close to the mouth (42°03'53.1"N, 27°58'12.5"E). The carapaces and plastrons of the captured individuals looked very deformed from their normal shape and color (Fig. 1). Some authors describe the same phenomenon for *E. orbicularis* from other locations in Bulgaria and Europe. Unjiyan (2000) published a photo of an adult female (p. 74, fig. 31) from 23.05.1967, from the Srebarna Reserve (NE Bulgaria), with similar deformations on the carapace, which we also observed at the mouth of the Veleka River, but the author does not give any explanations for this condition. Similar deformations of the carapace

were also observed by Dr. O. Todorov (2022, pers. comm.) from the Srebarna Reserve.



**Fig. 1.** The study site (a temporary spillway near the mouth of Veleka River ("Strandzha" NP).

A possible explanation for the observed deformities is provided by Cyren (1941), who described an adult *E. orbicularis* of Euboea, Greece with a carapace that also had deformities (very similar to those observed by us). The stated cause is a significant overgrowth of algae on the shell. According to the author, this did not interfere in any way with the turtle he describes.



**Fig. 2.** The captured individuals of *E. orbicularis* from the mouth of Veleka River. Photos: I. Mollov. All captured individuals have severe deformities on the carapace and plastron, where the black smooth other shell with the normal coloration for this species is completely destroyed and lower layers significantly deformed.

**Table 1.** Morphometric characteristics of the captured *Emys orbicularis* individuals with deformed carapaces from Veleka River (see Mollov et al. (2021) for methodology and abbreviation).

No	Sex	Weight (W), g	SCL, mm	MPL, mm	H, mm	MCW, mm	Date (hour)
1.	Female	475	131.5	125.0	56.0	96.0	01.06.2021 / 17:09
2.	Male	485	140.0	134.0	59.0	108.6	01.06.2021 / 17:29
3.	Male	660	153.0	147.0	66.0	112.4	01.06.2021 / 17:29
4.	Female	515	133.5	130.0	55.0	120.0	2.7.2021 / 14:35

We think that this explanation fits, since the same deformities are presented in Akgul et al. (2014, p. 27, fig. 4) from *E. orbicularis* individuals from Turkey, and the extend of the deformities, depends on the the extent

of the algal plaques. If the reason for these deformities was something in the water (like pH, salinity, etc.), then all turtles would have been affected. We found these deformities on only these four individuals.

In our opinion much more individuals are affected by the algae, but we managed to capture only four. All captured individuals seemed otherwise healthy and undisturbed by these deformities. Also we did not observe this phenomenon on *Mauremys rivulata* (occurring sympatrically with *E. orbicularis* at the study site). Again based on the results presented by Akgul et al. (2014) *E. orbicularis* is much more affected (especially adult turtles), than *M. rivulata*.

Soylu et al. (2006) reported fifty-three species of epizoic algae growing on *Emys orbicularis* from several locations in the Central Anatolia region, Turkey, with significant variation in algal communities from different sites. Akgul et al. (2014) studied in more detail the algae developing on the surface of the carapace of individuals of *M. rivulata* and *E. orbicularis* from Kayak River Delta (Saros Gulf, Canakkale Province, Turkish Thrace). The study describes fourteen taxa of epizoic algae, the most common being species from the genera *Chamaesiphon*, *Phormidium* and *Oscillatoria*. Greater algal growth was found on *E. orbicularis* than in *M. rivulata*. A similar study was also done by Fayolle et al. (2016), who studied epizoic algae on the carapaces of a total of 60 ind. of *Emys orbicularis* in three shallow Mediterranean wetlands located in the Camargue, France. The carapace and plastron of the individuals were sampled, and seventy-seven epizoic algal species were identified, grouped into 51 Bacillariophyta, 11 Chlorophyta, 7 Cyanophyta, 6 Euglenophyta, 1 Dinophyta and 1 Xanthophyta taxa. These findings show a clear distribution of epizoic algae according to taxonomic group density, with the taxa Chlorophyta and Cyanophyta dominating the carapace and representatives from the taxon Xanthophyta (genus *Vaucheria*) dominating the plastron. Algal assemblages did not vary significantly among the wetlands studied.

Studies on the epizoic algal assemblages on the freshwater turtles in Bulgaria has not

been conducted so far, so in our opinion this finding is important and could serve as basis on future research on this interesting symbiotic relationship. The relationship between turtle and algae is considered commensal, since algae take advantage of the movement of their host for access to resources and dispersion, while algae generally have little effect on the health of their host (Wahl, 2008; Roubeix et al., 2021).

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