

Attempting courtship between *Emys orbicularis* and *Trachemys scripta* (Testudines: Emydidae)

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The Pond Slider, *Trachemys scripta* (Thunberg in Schoepff, 1792), is generally considered as an invasive species with a negative effect on autochthonous turtles in particular areas. Allochthonous populations were established in the various natural freshwater ecosystems outside its natural distribution range in the USA, and this species has been cited as the most widely distributed invasive reptile species in the world (Kraus, 2009) and is listed among the 100 “World’s Worst Invaders” (Lowe et al., 2000). The expected advantage of the Pond Slider over the native European pond turtle, *Emys orbicularis* (Linnaeus, 1758), lies in the lower age at maturity, higher fecundity and larger adult body size (Arvy and Servan, 1998). Turtles compete for food, nesting sites and basking places, and they can be involved in interference competition (Cadi and Joly, 2003, 2004). A threat to native turtles comes also from pathogens of which pond sliders can also serve as vectors (e.g. Meyer et al., 2015). However, successful breeding of *Trachemys* is probably considered as the biggest problem, and was recorded in Europe for several times (see Standfuss et al., 2016 and literature therein). Despite the fact, that their actual impact on the ecosystem is hard to assess, knowledge in respect to its abundance in Europe, and potential interactions with native species are hence of great value.

The biggest question under debate, regarding the introduction of Pond Sliders in Europe, is devoted to impact of *T. scripta* on *Emys orbicularis* (e.g. Cadi and Joly, 2003, 2004). These species often occur syntopically at localities in different areas of Europe. Both species have a similar ecology and therefore

interspecific competition is expected. For example, Cadi and Joly (2004) observed in experimental ponds during the mating period underwater pursuits between *Trachemys* males and *Emys* females that were not observed in natural control ponds. As far as we know, no such behaviour has ever been observed in wild populations in Europe.

The following observation was recorded on the locality called “Biskupické rameno”, located in the southern suburban area of Bratislava in Slovakia (48.10°N, 17.14°E, 131 m a.s.l.). This locality is formed by an old oxbow of the Danube River, well known for the occurrence of allochthonous *T. s. scripta* and *T. s. elegans* (Wied-Neuwied, 1839) from the USA, as well as autochthonous *E. orbicularis*. Although the population of *E. orbicularis* in the oxbow is considered as a part of the Danubian population of the species, the individuals living there were introduced from Hungary (see Jablonski et al., 2015 and literature therein for details). The oxbow is approximately four kilometres long and 20 m wide and surrounded by alluvial forest. The two species of turtles are observed there regularly, most easily during spring months. On 19th April 2013, the second author of this paper observed and photographed an adult female of *T. scripta* with an adult male of *E. orbicularis* basking on old tree trunks in shallow water. Around 9:10 am (local time) the female of *T. scripta* was followed by a male of *E. orbicularis* over a short distance and thereafter the male clambered on the female carapace. The female stopped its motion and let the male climb up on the carapace. During a period of about five minutes, the male curled its tail on the female’s carapace and vibrated with the lower side of its head and neck and repeatedly pressed onto the dorsal head side of the female (Fig. 1A). The observation ended when the female dived into water with the male still holding on to its (Fig. 1B). The female was larger than the male. None of the individuals was observed subsequently. According to our best knowledge, this is the first record

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Figure 1. Attempting courtship recorded between *Emys orbicularis* and *Trachemys scripta* from Slovakia. A – male of *E. orbicularis* climbing on the female's carapace and vibrating with its head; B – diving female of *T. scripta* with male holding on to the carapace. Photos by J. Mrocek.

of attempting courtship between autochthonous *E. orbicularis* and introduced *T. scripta* ssp. *elegans*.

Courtship in freshwater turtles includes usually a typical behaviour accompanied by visual, tactile, olfactory, and auditory signals, and might boost the evolution of sexual dimorphism, which is directly subject to natural selection (Liu et al., 2013). Mating of *E. orbicularis* takes place directly after hibernation, and during this period turtles are easily observed. They often copulate under water or females are submerged and males are above the water surface. The male of a copulating couple is usually smaller than the female. High activity of *E. orbicularis* males was recorded in Slovakia during early April, with the first successful copulation around mid-April, or early May (Novotný et al., 2004).

Similar interspecific observations of courting behaviour are very rare. The male exhibited all courtship signs known from *E. orbicularis* (quick climbing on the carapace of female and holding on to it, tail curling, head vibrating and pressure on the head of the female; Lác, 1968). The initiation of successful mating behaviour depends at first on recognition of conspecifics and then on the opposite sex (see Liu et al., 2013 and literature therein). Despite that, there are noticeable morphological and ecological discrepancies between herein described species, which should prevent courtship (colouration, carapace size, body shape). On the other hand, several studies have indicated that body contour is an important visual signal in the initial stages of turtle courtship (e.g. Hidalgo, 1982; Baker and Gillingham, 1983). An active response to moving objects that resemble turtles was recorded by Hidalgo (1982) in male of *Rhinoclemmys pulcherrima* (Gray, 1855). Baker and Gillingham (1983) have repeatedly observed a male *Emydoidea blandingii* (Holbrook, 1838) mounting a rock with a similar size as the carapace of females of the species. Several anecdotal observations involving turtles misidentifying potential mates are known: *Mauremys rivulata* (Valenciennes in Bory de Saint-Vincent, 1833) male courting *T. scripta* female (Eglis, 1962); *T. taylori* (Legler, 1960) adult male attempting courtship with different species and sexes of *Chrysemys picta* (Schneider, 1783), *Malaclemys terrapin* (Schoepff, 1793), *Pseudemys peninsularis* Carr, 1938, *P. nelsoni* Carr, 1938, *T. scripta elegans* and *Sternotherus minor* (Agassiz, 1857) (Davis and Jackson, 1973); *Glyptemys muhlenbergii* (Schoepff, 1801) male mounting *Clemmys guttata* (Schneider, 1792) female and conspecific males (Arndt, 1986); and Kramer and Fritz (1989) observed *P. nelsoni* with a preference for a *Pseudemys concinna* (Le

Conte, 1830) female. On the basis of these records, we can assume that our observation falls into this category of misidentifications of potential mates. As indicated by Poschadel et al. (2006), males of *E. orbicularis* probably prefer to mate with larger females. Thus, in the initial stages of the courtship, body shape as a visual signal might not work for the recognition of conspecifics or sex (Liu et al., 2013). This could be important especially in low density populations of *E. orbicularis* in border areas of the species, which include the territory of Slovakia (Jablonski et al., 2015). Courting males of *E. orbicularis* can stay with selected females for around two weeks and copulate repeatedly (Mertens, 1950; Lác, 1968). With the increased occurrences of females of the introduced species at particular localities, there is a possibility that males of *E. orbicularis* would spend a part of their energy in courtship with females of the wrong species and less likely find females of their own species. This could potentially lead to a reduction in gravid females of *E. orbicularis* and the successful reproduction of the species. Thus, our observation suggests that it is important to remove non-native species of turtles from sites where autochthonous turtle species occur.

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