Records of invasive *Trachemys scripta elegans* (Wied-Neuwied, 1839), in cenotes of the Yucatán Peninsula, Mexico

The Red-eared Slider, *Trachemys scripta elegans* (Wied-Neuwied, 1839) is native to south-eastern USA and north-eastern Mexico (van Dijk et al. 2012). It belongs to a globally introduced species of turtle and is listed among the 100 worst invasive alien taxa by the IUCN Invasive Species Specialist Group (Lowe et al. 2000). According to the Global Invasive Species Database (IUCN SSC Invasive Species Specialist Group 2010), where its occurrence is reported from every continent of the world except Antarctica, there are currently no records mentioned for Mexico, probably because no distinction has been made between provinces where it is native and where it was introduced. Van Dijk et al. (2012) included the Mexican states of Nuevo Leon and Tamaulipas into the native range of *T. s. elegans* and furthermore mentioned Mexico as one of the countries where it has been introduced, unfortunately without pointing out the affected states. In the present paper, records of *T. s. elegans* on the Peninsula of Yucatán, Mexico are reported and their influence on current debates in taxonomy is addressed.

During a trip to the Yucatán Peninsula in February 2012, a number of cenotes (water-filled sinkholes related to Yucatán's karst system, Fig. 1) were visited to search for turtles, primarily the Meso-American Slider *Trachemys venusta* (Gray, 1855). This species is known to occur in wide parts of the peninsula (Legler 1990) and is regularly encountered by cave divers. Along with several Meso-American Sliders, two specimens of *T. s. elegans* (one male, one non-gravid female, Figs. 2-5) were found in two cenotes near the city of Tulum. After capturing them by hand, they were measured with a ruler and photographed, then released where they were caught. Locality and morphometric data are detailed in Table 1. Observations on offered juveniles in the streets of Tulum and the usage of cenotes by local inhabitants and tourists as recreational areas suggest that these Red-eared Sliders were most likely released pets.

Fig. 1: Overview of Cenote Aktun Ha/Carwash. Habitat of *Trachemys venusta* (Gray, 1855) and *Trachemys scripta elegans* (Wied-Neuwied, 1839), which occur in syntopy here; record locality of *Trachemys scripta elegans* #1.

It is impossible to determine how long these two specimens lived in the cenotes, however, the male clearly showed signs of age-dependent melanism. Considering that (i) pet turtles are frequently released when

Table 1: Morphometric and locality data of two *Trachemys scripta elegans* (Wied-Neuwied, 1839) found in cenotes of the Yucatán Peninsula, Mexico. SCL - Straight Carapax Lenght, SCW - Straight Carapax Width.

Individual	Sex	Locality Name	Coordinates	SCL	SCW
Trachemys scripta elegans #1	female	Cenote Carwash	20°16' 26.4"N, 87°29' 9.6"W	20 cm	15 cm
Trachemys scripta elegans #2	male	Cenote Cristal	20°11' 24"N, 87°29' 56.4"W	16 cm	13 cm

Fig. 2: Plastron view of *Trachemys scripta elegans* (WIED-NEUWIED, 1839) specimen #1.

Fig. 3: *Trachemys scripta elegans* (WIED-NEUWIED, 1839) specimen #1 showed the dark red ear mark typical to the subspecies *elegans*.

Fig. 4: *Trachemys scripta elegans* (WIED-NEUWIED, 1839) specimen #2 showed clear signs of melanism.

Fig. 5: Plastron view of *Trachemys scripta elegans* (WIED-NEUWIED, 1839) specimen #2.

Fig. 6: *Trachemys venusta* (GRAY, 1855) caught in Cenote Cristal; plastron view. Along with other characteristic traits, the plastral pattern distinguishes this turtle from *Trachemys scripta elegans* (WIED-NEUWIED, 1839).

exceeding a size that impedes easy keeping in a tub (which is approximately reached at about maturity in male sliders) and (ii) melanism only occurs in old adults, it can be concluded that the male had lived in the cenote for a longer period. In the biogeographic literature (e.g., IVERSON 1992) and field guides published prior to 2002 (CAMPBELL 1998; LEE 2000), the slider turtle of the Yucatán Peninsula was assigned to the species *T. scripta*, because the autochthonous slider species *Trachemys venusta* (GRAY, 1855) was considered a subspecies of *T. scripta* (THUNBERG in SCHOEPF, 1792) until SEIDEL's (2002) revision of the genus. This is why it is unclear since when the Red-eared Slider is known from the Yucatán Peninsula. Moreover, *T. s. elegans* may be easily mistaken for *T. venusta* (Fig. 6) by laymen and thus, not be reported as an invasive species.

Besides the classic threats to ecosystems by alien species such as their effect on competition, habitat alteration and the introduction of pathogens, there is another problem emerging from *T. s. elegans* occurring in syntopy with *T. venusta*: According to reports of a Mexican turtle breeder (SANTANA 2009), *T. s. elegans* and *T. venusta* will readily hybridize in captivity and therefore it is most likely that there are cases of hybridization under natural conditions as well.

This further complicates taxonomic research on the phenotypically diverse slider forms of Latin America: MCCORD et al. (2010) morphologically described three new subspecies of *T. venusta* including a subspecies endemic to the cenotes of the northwestern Yucatán Peninsula, whereas FRITZ et al. (2011), on the basis of their molecular study of the genus *Trachemys*, considered *T. v. venusta* a subspecies of *Trachemys ornata* (GRAY, 1831), without discussing the status of *T. v. iversoni* MCCORD, MEHDI-OUNI, HAGEN & BLANCK, 2010. Further genetic and morphologic analyses are needed to shed light on the relationships among slider turtles. Future studies on the taxonomy of Mexican sliders should involve samples from syntopic populations of *T. s. elegans* and *T. venusta* and carefully avoid the inclusion of specimens of hybrid origin.

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