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The turtles (Testudines) of Glasgow Botanic Gardens including the first record of *Mauremys reevesii* (Gray, 1831) for the U.K. outwith captivity

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This Short Note provides information on the turtles (Testudines) of Glasgow Botanic Gardens, Scotland (GBG).

It first came to CC's attention on 19th January 2022 that there were several terrapins (a polyphyletic group of freshwater turtles belonging to Order Testudines) present in a greenhouse (NS5681467536) to the north of The Main Range at GBG. These terrapins seem not to have been recorded previously, although this is likely to be due to the fact the greenhouse in which they are located is not accessible to the general public. It was evident that at least three types were present.

CC and TM conducted a thorough survey of the terrapins on 26th January. A net was used to extract them from the water troughs in which they were living, and detailed photographs were taken to allow identification. Identification was undertaken by CC and TM, who consulted relevant experts (acknowledged below), and confirmed using keys (CITES, 1999; Virginia Herpetological Society, 2020). Stevie Jakusz (GBG) informed the authors that the turtles had been retrieved from the publicly accessible parts of the Gardens, having presumably been released as unwanted pets.

Two species of terrapin were confirmed to be present at GBG – *Trachemys scripta* (Schoepff, 1792) and *Mauremys reevesii* (Gray, 1831). This appears to be the first record of *M. reevesii* in the U.K.

It should be noted that terrapin eggs were found in the greenhouse during a follow up survey visit by CC on 8th May 2022. Terrapin eggs had been found previously but failed to develop, suggesting conditions are not suitable for breeding (Stevie Jakusz, pers. comm.).

Trachemys scripta

Two subspecies of *T. scripta* were confirmed to be present at GBG – *T. scripta elegans* (two individuals) (Fig. 1) and *T. scripta scripta* (four individuals) (Fig. 2), which have both been recorded infrequently in Scotland,



Fig. 1. Red-eared slider (*Trachemys scripta elegans*), Glasgow Botanic Gardens, Scotland. (Photo: Chris Cathrine)



Fig. 2. Yellow-bellied slider (*Trachemys scripta scripta*), Glasgow Botanic Gardens, Scotland. (Photo: Chris Cathrine)

including the Glasgow area (Glasgow Museums Biological Records Centre (GMBRC); McNerny & Minting, 2016; Cathrine, 2021). The five eggs found on 8th May (Fig. 3) had a mean length of 42.5 mm, which is within the range 23.5-44.2 mm reported for *T. scripta* (Dundee & Rossman, 1989). They are therefore considered likely to relate to this species, and so are derived from either *T. scripta elegans* or *T. scripta scripta* present in the greenhouse.

T. scripta, often referred to as the “common slider”, is a species of terrapin native to south-eastern and central U.S.A. and northern Mexico (Seidel & Ernst, 2006). There are three described subspecies – *T. scripta elegans* (Wied-Neuwied, 1839) (red-eared slider), *T. scripta scripta* (Schoepff, 1799) (yellow-bellied slider), and *T. scripta troostii* (Holbrook, 1836) (Cumberland slider) (Seidel & Ernst, 2006). All are known from the U.K., but *T. scripta elegans* is by far the most commonly encountered, followed by *T. scripta scripta* (Allain, 2019). This is unsurprising, given these turtles arrive in the wild as a result of the exotic pet trade: *T. scripta elegans* is the most attractively marked sub-species, followed by *T. scripta scripta*, with



Fig. 3. Common slider (*Trachemys scripta*) eggs, Glasgow Botanic Gardens, Scotland. These could be eggs of the red-eared (*T. scripta elegans*) or yellow-bellied (*T. scripta scripta*) subspecies. (Photo: Chris Cathrine)

T. scripta troostii being largely dull with fewer markings - although some do have spectacular green carapaces, they can also be brown with variable patterning.

T. scripta is included in the IUCN list of the 100 most invasive species, and now occurs in many countries, including within the European Union where its import has been banned due to the establishment of wild populations with an expanding range (Lowe *et al.*, 2000; Kopecky *et al.*, 2013; Allain, 2019). However, the climate in the U.K. is unsuitable for breeding, meaning populations are limited by individual lifespans, although this species can live for over 20 years, and as long as 40 years in exceptional cases. They can therefore persist in a waterbody for a lengthy period depending on the age of the animals when they were released or escaped from captivity (Wareham, 2008; Myhrvold *et al.*, 2015; McInerny & Minting, 2016; Allain, 2019).

Mauremys reevesii

A single specimen of *M. reevesii* was found at GBG (Figs. 4 and 5). This species does not appear to have been reported from the U.K. previously. The eggs recorded on 8th May were considerably longer than the mean length of *M. reevesii* eggs reported as 34.0 mm and 35.0 mm by Yi *et al.* (2019) and Zhao *et al.* (2013) respectively. It is therefore considered unlikely the eggs recorded on 8th May relate to this species.

M. reevesii, commonly known as the “Chinese pond turtle”, is a species of terrapin found in China, Taiwan, the Korean Peninsula (excluding Jeju Island), and Japan, although recent genetic studies indicate it is likely to have been artificially introduced to the latter country (van Dijk, 2011; Suzuki *et al.*, 2011; Oh *et al.*, 2017; Rhodin *et al.*, 2021). This species is known to have established introduced populations in Timor-Barat (Indonesia), Timor-Leste, Palau, Spain, and the U.S.A. (Kaiser *et al.*, 2010; van Dijk, 2011; Poch *et al.*, 2020). Furthermore it has recently been found in Ireland (Rob Gandola, pers. comm.).



Fig. 4. Chinese pond turtle (*Mauremys reevesii*), Glasgow Botanic Gardens, Scotland; dorsal view, including carapace. (Photo: Chris Cathrine)



Fig. 5. Chinese pond turtle (*Mauremys reevesii*), Glasgow Botanic Gardens, Scotland; ventral view, including plastron. (Photo: Chris Cathrine)

Populations of *M. reevesii* have declined significantly in their natural range due to a variety of factors including habitat destruction and fragmentation, water pollution from industrial development, use in traditional Chinese medicine, and, more recently, the introduction of invasive non-native species – *T. scripta elegans* in particular (van Dijk, 2011; Oh *et al.*, 2017; Jo *et al.*, 2017; Koo *et al.*, 2019). The larger *T. scripta elegans* has been found to outcompete and exclude the smaller *M. reevesii*, presenting a further threat to this endangered species (van Dijk, 2011; Oh *et al.*, 2017; Jo *et al.*, 2017; Koo *et al.*, 2019). As such, *M. reevesii* is included on the International Union for Conservation of Nature (IUCN) Red List as Endangered and is also listed on Appendix III of the Convention on International Trade in Endangered Species (CITES) of Wild Flora and Fauna, restricting international sale (van Dijk, 2011; CITES, 2015).

Mauremys spp. terrapins are currently being promoted within the exotic pet trade as smaller and less invasive alternatives to *T. scripta*. It may indeed be the case that these terrapins are less invasive than *T. scripta* – an assessment of risk of exotic freshwater turtles within the

European Union (undertaken prior to Brexit, and so including the U.K.) being invasive found *Trachemys scripta* to be of “moderate” risk, whereas *M. reevesii* and *M. sinensis* were considered to be of “low” risk (Kopecky *et al.*, 2013). However, *M. reevesii* has established populations outwith its native range elsewhere in the world, and is considered to be Endangered under the IUCN Red List with their trade as pets restricted under Appendix III of CITES which casts significant doubts over the sustainability or ethicality of this species within the pet trade unless the lineage of the individual can be linked unambiguously to legitimate captive breeding.

It is unlikely that *M. reevesii* would establish functional populations in the U.K., as the climate is even less suitable for this species than for *T. scripta*, but individuals may persist outdoors for a considerable period, as this terrapin is known to live for over 20 years (Kopecky *et al.*, 2013; Myhrvold *et al.*, 2015). Indeed, one of the threats to natural populations of *M. reevesii* and its introduction to areas outwith its native range is its use in traditional Chinese medicine due to its renowned longevity. Recent genetic studies suggest it may possess longevity-related genes (Kaiser *et al.*, 2010; van Dijk, 2011; Yin *et al.*, 2016).

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