The long reach of the Suez Canal: *Lagocephalus sceleratus* (Gmelin, 1789) an unwanted Indo-Pacific pest at the Atlantic gate

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**Abstract**

The silver-cheeked toadfish *Lagocephalus sceleratus* (Gmelin, 1789) is rapidly expanding westward through the Mediterranean Sea. On December 2017, a single individual was caught by a local fisherman at the westernmost end of the basin, the Straits of Gibraltar at San Amaro beach, Bahia norte, Ceuta, Spain (35.8974; −5.2994). This new record opens to the possibility of this Indo-Pacific pest to spread beyond the Mediterranean region, prospecting the future extension of Lessepsian bioinvasions to the Atlantic Ocean.

**Key words:** Lessepsian migration, Mediterranean Sea, Atlantic Ocean, geographical spread, biological invasions

**Introduction**

The opening of the Suez Canal has caused dramatic consequences to the Mediterranean ecosystems, which are being progressively invaded by tropical species entering the eastern Mediterranean through the Suez Canal, a process generally known as Lessepsian migration. So far, more than one hundred fishes have entered the Mediterranean through this route, and the number is still increasing due to the continuous detection of newly introduced species (Golani et al. 2018). Among the most successful and unwanted new guests there is the silver-cheeked toadfish *Lagocephalus sceleratus* (Gmelin, 1789). This is a toxic pufferfish, one of the “worst” invaders of the Mediterranean Sea (Streftaris and Zenetos 2006) that has already caused severe ecological and socio-economic impacts in the Eastern sectors of the basin (Nader et al. 2012; Kalogirou 2013). Due to its content in tetrodotoxin, the species is highly toxic to consumption and many Mediterranean countries have carried out awareness initiatives to reduce the associated risks and to limit the impacts of this invasion (e.g. Souissi et al. 2014; Azzurro et al. 2016; Katikou 2019). Today, the consumption
of the silver-cheeked toadfish is illegal in many nations, including Japan and Malaysia where other pufferfish are traditionally (and legally) consumed. At the European level, European Regulations Directive 91/493/CEE, 853/2004/EC and 854/2004/EC have banned the marketing and consumption of the silver-cheeked toadfish and similar legislative measures have been adopted in other eastern Mediterranean countries (Sabrah et al. 2006; Halim and Rizkalla 2011; Nader et al. 2012). On July 27th 2011, Lebanese authorities (Decree 1/676) banned the fishing, transportation, selling and consuming of all pufferfish species, including *Lagocephalus* spp. and *Torquigener* spp (MB personal comm.). Notwithstanding these bans, the silver-cheeked toadfish is still marketed in several eastern countries, such as Egypt, Turkey and Lebanon (Nader et al. 2012; MB personal comm.) regardless of the risk it poses to public health.

**Materials and methods**

On January 2018, the observation of a single individual of the silver-cheeked toadfish was posted to “Seawatchers” (http://www.seawatchers.net), a marine citizen science project web platform designed to collect citizen-generated data. The observation was posted within the “Invasive fish” project, which focuses on the distribution of non-indigenous fish species in the Mediterranean region and reports the occurrence of a number of target invaders. For each record, the system gives the possibility to upload one or more pictures together with additional relevant information (e.g. date, depth, geographical coordinates of the sighting and additional notes). A team of professional scientists with specific taxonomic expertise, act as editors and periodically verify-validate the records posted by each observer. The record was kept on stand-by until its validation, waiting for direct contacts with the registered observer and with the fisherman, which captured the fish.

**Results**

The posted observation (Figure 1) corresponded to a single capture of the silver-cheeked toadfish *L. sceleratus*, which was realized on December 21st 2017. The individual was caught by a local recreational fisher along the coast of Gibraltar, at San Amaro beach, Bahia norte, Ceuta, Spain (35.8974; −5.2994). The photograph allowed the depiction of distinctive taxonomical characters, primarily the distinct wide silver band on the lower part of the flanks, the silver blotch in front of the eyes, the white belly and the spots of equal size regularly distributed along the dorsal area, in agreement with previous descriptions of this species (e.g. Akyol et al. 2005). The fisher and the registered user were interviewed in June 2018 by phone and in the local language (Spanish) and a personal interview with the registered user confirmed the veracity of the posted observation. According
The silver-cheeked toadfish *Lagocephalus sceleratus*. Screenshot of the Gibraltar individual posted on the website Seawatchers (http://www.observadoresdelmar.es) by a registered observer and later validated by the Seawatchers scientific team (EA, MB, JG).

Figure 2. Occurrence records of the silver-cheeked toadfish *Lagocephalus sceleratus* in the Mediterranean Sea (modified from Coro et al. 2018), with indication of the present finding in the Straits of Gibraltar (circled cross).

to both the interviews and the information uploaded on Seawatchers, the capture was realized with hook-and-line in shallow water and the fish size was estimated to be around 50–60 cm TL and 3 kg of total weight. The
individual was photographed alive in a pool and was later discarded upon its death, at the end of the fishing day.

Discussion

This new observation documents the spread of the silver-cheeked toadfish to the westernmost end of the Mediterranean Sea (Figure 2) but also opens to the possibility of this Indo-Pacific species to expand beyond the Mediterranean Sea, prospecting the future spread of Lessepsian bioinvasions to the Atlantic Ocean. So far, the potential of these species to invade Atlantic waters has been seldom considered (Bellwood and Goatley 2017), with modeling efforts typically limited to the Mediterranean region (see Coro et al. 2018 for L. sceleratus). Yet, this possibility needs to be seriously considered in light of the accelerated expansion of Lessepsian invaders under climate change scenarios (Marras et al. 2015; D’Amen and Azzurro 2019).

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